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NATIONAL INSTITUTE OF ARTHRITIS, METABOLISM, AND DIGESTIVE DISEASES

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	It.	Italian
Ar.	Arabic	Jap.	Japanese
Bul.	Bulgarian	Kor.	Korean
Ch.	Chinese	Latv.	Latvian
Cz.	Czech	Lith.	Lithuanian
Dan.	Danish	Nor.	Norwegian
Dut.	Dutch	Pol.	Polish
E.	English	Por.	Portuguese
Eston.	Estonian	Rum.	Rumanian
Fin.	Finnish	Rus.	Russian
Fl.	Flemish	Ser.	Serbo-Croatian
Fr.	French	Sl.	Slovak
Ger.	German	Sp.	Spanish
Gr.	Greek	Sw.	Swedish
Heb.	Hebrew	Th.	Thai
Hun.	Hungarian	Turk.	Turkish
Ic.	Icelandic	Uk.	Ukrainian
In.	Indonesian	Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	mC,μC	milli-,microcurie(s)
ADP	adenosine diphosphate	mg	milligram(s)
AMP	adenosine monophosphate	min	minute(s)
ATP	adenosine triphosphate	ml	milliliter(s)
BSP	sulfobromophthalein	mm	millimeter(s)
C	degrees centigrade	MTD	maximum tolerated dose
cm	centimeter(s)	ng	nanogram (10^{-9})
CNS	central nervous system	pg	picogram (10^{-12})
cpm	counts per minute	p.o.	orally
DNA	deoxyribonucleic acid	ppm	parts per million
e.g.	for example	r	Roentgen
g	gram(s)	RBC	red blood cells (erythrocytes), red blood count
μg	microgram(s)		
hr	hour(s)	resp.	respectively
i.m.	intramuscular	Rev.	review (only in citations)
i.p.	intraperitoneal	RNA	ribonucleic acid
IU	international unit(s)	s.c.	subcutaneous
i.v.	intravenous	sec	second(s)
kg	kilogram(s)	SGOT	serum glutamic-oxalacetic transaminase
LD_{50}	median lethal dose(s)	SGPT	serum glutamic-pyruvic transaminase
LDH	lactic acid dehydrogenase	U	unit(s)
m	meter(s)	UV	ultraviolet
M	molar	WBC	white blood cells (leukocytes), white blood count
mEq	milliequivalent(s)	yr	year(s)
mM	millimolar		
μM	micromolar		

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

5763 SMALL-INTESTINAL LENGTH: AN INTRAOPERATIVE STUDY IN OBESITY. *(E.)* Backman, L.; Hallberg, D. (Karolinska Hosp., Stockholm, Sweden). *Acta Chir. Scand.* 140(1):57-63, 1974.

Small intestine length, important because it gives an indirect determination of resorptive capacity, was measured during abdominal surgery in 56 subjects undergoing small intestine shunt for massive intractable obesity and in 32 control patients of normal weight with elective gastrointestinal surgery. Two measurements of length between the ileocecal valve and Treitz ligament were made with a common white cotton band, excluding the duodenum. The 2nd figures were always 10% shorter, the difference being independent of the lengths of the measured segments; the shortening indicated that handling and stretching of the intestine influenced the 2nd measurement due to increased contractility of the smooth muscle. Serotonin released in the intestinal wall also increased reactivity. In some cases, a 3rd measurement gave values very close to the 2nd. All measurements showed that the female small intestine was shorter than the male. In obese patients with a mean body weight of 149.7 kg for men and 137.2 kg for women, the small intestine length was significantly longer than in controls: for men, 8.24 m compared with 6.98 m in the control group (mean body weight of 69.2 kg); values for women were 7.34 m in the obese group and 6.16 m in the controls (mean body weight of 61.5 kg). Significant correlations between small intestine length and various other body parameters were also found, the highest being body surface. A statistically significant difference in small intestine length was associated with age of onset of obesity in that the small intestine was longer in subjects with onset after puberty; age *per se* was not a factor. Fat cell diameter, surface, and volume, estimated in 18 cases peroperatively, showed no significant correlation to small intestine length, and there was also no significant difference between the 2 groups regarding body weight and body height. Possible explanations for the correlation between overweight and a longer small intestine include (1) a congenitally long intestine resulting in a possible hyperplasia and (2) development of a longer small intestine secondary to an adaptive mechanism such as overfeeding (causing hypertrophy) and endocrine compensation resulting in both hyperplasia and hypertrophy. However, the measurements obtained here indicating that belated onset of obesity is associated with a longer small intestine than an earlier onset do not favor the above theories.

5764 HISTOCHEMICAL CHARACTERIZATION OF MUCINS IN THE HUMAN GASTROINTESTINAL TRACT: NORMAL RECTAL MUCOSA. *(It.)* Ravetto, C.; Volpi, G.; Di Marco, G. (Inst. Normal Hum. Anat., Univ. Modena, Italy). *Arch. Ital. Mal. App. Dig.* 37(1):49-61, 1973.

Histochemical studies were performed on goblet cells in sections made from rectal biopsies taken from women, aged 30-50 yr, with no evidence of gastrointestinal disease. None of these subjects were undergoing any treatment which would change normal gastrointestinal function in any way. Two types of mucin were found. One gave a positive reaction with stains for sulfated mucins and was found primarily in goblet cells at the bottom of crypts, but was also present in variable amounts in more superficial cells. The second type of mucin gave negative tests for sulfated mucins but reacted positively with reagents for carboxyl groups. Deacetylation with ammonia in an ethanol-water solution intensified its reactions with periodic acid-Schiff (PAS) reagent and with sialidase. Thus, this fraction consists of a mucin containing sialidase-labile sialic acid and N-acetyl-O-diacetylsialic acid which is attacked by sialidase only after deacetylation. Neither mucin reacted with hyaluronidase or chitinase, indicating that no chondroitin sulfate or hexosamines with a β-1,4-glycosidic linkage are present. Variability in the intensity of staining with PAS in the subjects examined appears to be physiological and not an indication of any manifest or latent pathological condition.

5765 THE DYNAMIC STRUCTURE OF A FLAT SMALL INTESTINAL MUCOSA STUDIED ON THE EXPLANTED RAT JEJUNUM. *(E.)* Loehry, C. A.; Grace, R. (Royal Victoria Hosp., Bournemouth, England). *Gut* 15(4): 289-293, 1974.

Small pieces of albino rat jejunum (3-4 cm long) with an intact blood supply were explanted, free mucosal surface uppermost, to the anterior abdominal wall. After 6 weeks the mucosa appeared totally flat in many areas, both histologically and under the dissecting microscope. The structure of the flattened mucosa was identical to that in celiac disease with hypertrophied intervillous ridges. A hemolytic-like change in mucosal dynamics is suggested, with primary increase in cell loss causing shortening of the villi, and a compensatory increased cell production in the crypts producing hypertrophy of the intervillous ridges to form a convoluted and flattened structure. Mitotic activity in the explanted mucosa was 510 mitosies/1000 crypt cells compared with a normal control rate of 250. Although no direct evidence of increased cell loss was seen, the histological appearance of trauma at villi tips was strongly indicative of a faster than normal rate of cell loss. Experiments with tritium-labeled thymidine demonstrated a considerably increased epithelial cell turnover with some disorganization of cell production and migration. If a hemolytic-like change in mucosal dynamics is applicable to the flat mucosa of celiac disease, increased cell loss may indicate a parallel increased loss of intracellular substances that the abnormal mucosa is unable to absorb (e.g., iron loss). In addition, each epithelial cell may be available for absorption for a shorter period, and some cells may be functionally immature at the crypt mouth. With disruption of cell production, many cells may never be fully available for absorption.

5766 SUBSURFACE CISTERNS IN MOUSE HEPATOCYTES. *(E.)* Tandler, B.; Hoppel, C. L. (Dept. Oral Biol, Med., Case Western Reserve Univ., Cleveland, Ohio). *Anat. Rec.* 179(2):273-284, 1974.

Weanling Swiss mice, both male and female, were placed on various diets, and liver sections examined by electron microscope. In all livers, regardless of diet or mode of tissue fixation, the apposed plasma membranes of adjoining hepatocytes were often underlain by a single layer of extensive subsurface membranous cisterns. These structures were of 2 configurations: (1) Flat, uninterrupted, rather extensive cisterns, clearly originating from the rough endoplasmic reticulum with which they were occasionally in direct continuity. Such cisterns often bore ribosomes on their deep surfaces, never on the surfaces that faced the plasmalemma. (2) Linear arrays of small, elongated, flattened, highly fenestrated and smooth-surfaced saccules, appearing to originate from elements of the smooth endoplasmic reticulum with which there was occasional continuity. No cisterns were observed at the periphery of bile canaliculi or in conjunction with their microvillous linings; at the microvillous border of hepatocytes facing the space of Disse; or at tight or gap junctions. Small hiatuses which accommodated occasional desmosomes were also seen. In general, these cisterns do not represent elements of endoplasmic reticulum that have been passively displaced by encroaching glycogen deposits since they are found in livers of animals totally depleted of glycogen for long periods through special diets. Concerning the undetermined function of subsurface cisterns, one hypothesis states that they are related to the electrophysiological properties of plasma membranes while another theory postulates their relation to metabolic interchange at cell surfaces.

5767 HYPERSENSITIVITY GRANULOMA OF THE INTESTINE: AN EXPERIMENTAL STUDY. *(E.)* Rao, I. R.; Sharma, L. K.; Prakash, A. (All-India Inst. Med. Sci. New Delhi). *Indian J. Surg.* 35(8):386-392, 1973.

Hypersensitivity lesions were experimentally produced in adult guinea pigs and adult rabbits. Antigens used included crystalline egg albumin, normal horse serum, human serum, and old tuberculin. The animals were sensitized to the antigen by the multiple portal technique with 0.5-1 ml of antigen injected each time. On the 17th day, the first challenge dose, (0.1-0.3 ml) of antigen, was delivered, injected subserosally into the terminal ileum and into the cecum between the arterial arcades. A second challenge dose was given 3 days later at the same site. Of a total of 158 animals, including 58 sensitized with saline, 75 (47.5%) developed granulomata in their bowel as a response to foreign antigen. A significant number (68%) of these belonged to the test groups; 28 intestinal granulomas were associated with tuberculin, 22 with horse serum, 18 with egg albumin, and none with human serum. The 12 granulomata obtained in the control group probably resulted from the absorption of challenge dose leading to the production of low grade immunization and granulomata formation. Mesenteric lymphadenopathy, peritoneal fluid, and peritoneal adhesions were also more frequent in the test groups. These results suggest that hypersensitivity may be one of the factors in the pathogenesis of granulomatous lesions of the bowel, tubercular or otherwise. However, they do not suggest any direct similarity between the experimentally produced granulomata and clinically observed lesions.

5768 HISTOLOGICAL CHANGES IN THE MUCOSA OF THE SMALL INTESTINE AFTER EXPERIMENTAL TRUNCAL VAGOTOMY. *(Ger.)* Ihasz, M.; Szepeshazi, K.; Koiss, I. (Semmelweis Med. Univ., Budapest, Hungary). *Z. Exp. Chir. (Jena)* 6(5):346-352, 1973.

Histological examinations were performed on sections from the middle part of the small intestine (about 70 cm from the duodenojejunal flexure) of 24 dogs 5-365 days after truncal vagotomy. Moderate dilatation of the lymphatics was observed during the first 4 weeks after surgery. During weeks 6-17 the height of the villi increased by 1/4-1/2, and a parallel decrease occurred in the thickness of the villi. Villi returned to their original height after 5 months. No evidence of villar atrophy was ever seen. During the first 7 weeks inflammatory infiltrates of WBC, lymphocytes, and plasma cells formed. This infiltration was most pronounced at the base of the mucosa and in the tunica propria between the 7th week and the 4th month. The small intestine was histologically normal 7 months after vagotomy. These findings suggest that it is unlikely that morphological changes occurring in the small intestine after vagotomy could account for postvagotomy diarrhea. This diarrhea appears to be caused by interaction of a number of factors including circulatory disorders, an increase in the bacterial flora, changes in the concentrations of pancreatic enzymes and bile salts, passage of stagnant stomach contents into the intestine, and others.

5769 CHANGES IN THE FINE STRUCTURE OF MOUSE GASTRIC EPITHELIUM PRODUCED BY ETHANOL AND UREA. *(E.)* Eastwood, G. L.; Kirchner, J. P. (U. S. Naval Hosp., Philadelphia, Pa.). *Gastroenterology* 67(1):71-84, 1974.

The ultrastructural sequelae of 2 dissimilar gastric mucosal barrier breakers, ethanol and urea, were investigated. Fasted adult male Swiss mice received ethanol (10%, 10% + 100 mN HCl, 25%, 25% + 100 mN HCl), urea (300, 900, or 1500 mN), or control solutions for periods up to 15 min *via* esophageal intubation. Both ethanol and urea produced morphological changes in some animals as early as after 2 min exposure. The first observable effects of ethanol involved nuclear and cytoplasmic changes within the surface mucous cells without apparent disruption of the apical cell membranes or tight junctions. These findings indicate that the lipid solubility of ethanol may allow it to diffuse rapidly through the apical membranes or tight junctions without causing appreciable damage until it is within the cells. In contrast, urea solutions initially caused distortion of the tight junctions and formation of vacuoles within the surface mucous cells while the remainder of the cells appeared normal. It is possible that urea, being relatively unable to cross gastric epithelial membranes may cause injury *via* osmotic forces. These studies show that, although different gastric mucosal irritants produce similar physiological effects, they are not uniform in their morphological sequence of injury.

5770 ULTRASTRUCTURAL IMMUNOCYTOCHEMICAL LOCALIZATION OF LYSOZYME IN THE PANETH CELLS OF MAN. *(E.)* Erlandsen, S. L.; Parsons, J. A.; Taylor, T. D. (Univ. Iowa Coll. Med., Iowa City). *J. Histochem. Cytochem.* 22(6):401-413, 1974.

Human lysozyme was localized immunocytochemically at the ultrastructural level within Paneth cells of man by using an unlabeled antibody enzyme method. Thin sections of human jejunum and ileum were embedded in Araldite or Epon and staining was facilitated by etching with hydrogen peroxide. Sections of intestine on grids were stained by successive flotation on rabbit antihuman lysozyme antiserum, goat or sheep antirabbit IgG antiserum, and soluble peroxidase-rabbit antiperoxidase complex, followed by incubation with diaminobenzidine and hydrogen peroxide. No staining was observed after prolonged fixation of tissue in glutaraldehyde or treatment of tissue with uranyl acetate in block. The unlabeled antibody enzyme method was 100-1000 times more sensitive than immunofluorescence. Specific staining for lysozyme was observed over secretion granules in the apical cytoplasm, within the region of the Golgi apparatus, and within some, but not all, lysosomes. No staining was observed within the cisternae of the rough endoplasmic reticulum or other cellular organelles. In view of previous evidence for secretory activity in the basal cytoplasm where rough endoplasmic reticulum is predominant, it is suggested that lack of staining of such structures may be related to the absence of tertiary structure conferring antigenicity to the lysozyme molecule. The immunocytochemical studies suggest that the antigenicity of lysozyme is first acquired as the enzyme travels through the Golgi region and is indirectly supported by the morphologic finding that the electron-dense secretory product of the Paneth cell is also first recognizable within the Golgi complex.

5771 THE RE-EPITHELIZATION OF INTESTINAL MUCOSA IN GAMMA-IRRADIATED, PARTIALLY SHIELDED GNOTOBIOTIC PIGLETS. *(E.)* Mandel, L.; Moravek, F.; Miler, I. (Inst. Microbiol., Prague, Czechoslovakia). *Strahlentherapie* 147(3):308-314, 1974.

To test the hypothesis that partial shielding during irradiation could overcome bone marrow damage and that after this treatment "pure" gastrointestinal post-irradiation syndrome might develop, experiments were carried out in which 14-day-old germ-free, *Escherichia coli* O 54-monoassociated, and conventional piglets were shielded on the forebody up to the caudal end of the sternum during exposure to 1200, 1800, or 2400 r from a cobalt bomb. Parallel experiments were carried out with unshielded animals. The unshielded germ-free animals survived the different exposures for 11-14 days, wheras the *E. coli*-associated animals and conventional piglets survived for only 3-4 days. The shielded germ-free and *E. coli*-associated animals survived 1200 r for over 50 days, whereas conventional animals survived only 16 days; and the shielded germ-free and *E. coli*-associated animals exposed to 1800 or 2400 r survived 14-20 days compared to 3-8 days for the conventional animals under the same conditions. Histologically, the bone marrow of the shielded part was normal with a tendency to hyperfunction. In conventional animals of all groups except those exposed to 1200 r with shielding, the typical gastrointestinal post-irradiation syndrome was observed with denuded intestinal mucous membrane, deep necroses reaching the muscular tunic, and penetration of intestinal bacteria into the intestinal wall. In germ-free pigs, both hemorrhagic diathesis and partial denudation of the intestinal epithelium were considered to be the cause of death, but no explicit signs of irreparable damage were seen in the intestinal epithelium, and, at the time of death, reepithilization had begun in the mucosa. Findings for *E. coli*-associated animals were similar to those for the germ-free animals. The causes of death in the conventional animals appeared to be loss of water and electrolytes, nutritional impairment, and infection. These causes did not apply to the germ-free and *E. coli*-associated animals, which were not dehydrated: these animals seemed well nourished until death, and infection in the germ-free animals was ruled out. It is not known whether damage of the intestinal mucosa or hemorrhagic diathesis was the predominant cause of death in the germ-free and *E. coli*-associated animals.

5772 EXTRINSIC PARASYMPATHETIC INNERVATION OF THE DISTAL COLON. *(E.)* Meier-Ruge, W.; Hunziker, O. (Sandoz Ltd., Basel, Switzerland). *Abdom. Surg.* 16(5):139-148, 1974.

5773 "CAVEOLATED CELLS" CHARACTERIZED BY DEEP SURFACE INVAGINATIONS AND ABUNDANT FILAMENTS IN MOUSE GASTRO-INTESTINAL EPITHELIA. *(E.)* Nabeyama, A.; Leblond, C. P. (Dept. Anat., McGill Univ., Montreal, Canada). *Am. J. Anat.* 140(2):147-166, 1974.

5774 CHANGES IN THE MUCOSA OF THE SMALL INTESTINE FOLLOWING METHOTREXATE ADMINISTRATION OR ABDOMINAL X-IRRADIATION. *(E.)* Altmann, G. G. (Dept. Anat., Univ. Western Ontario, London, Canada). *Am. J. Anat.* 140(2):263-280, 1974.

5775 CELLS OF THE SPINAL TYPE IN THE GANGLIA OF THE LARGE INTESTINE. *(Rus.)* Lukashin, V. G. (I.P. Pavlov Inst. Physiol., Leningrad, USSR). *Arkh. Anat. Gistol. Embriol.* 64(4):39-43, 1973.

5776 REGENERATION OF THE MUSCULATURE OF THE LARGE INTESTINE UNDER EXPERIMENTAL CONDITIONS. *(Rus.)* Bazhenov, D. V. (Kalinin Med. Inst., USSR). *Arkh. Anat. Gistol. Embriol.* 64(6):81-85, 1973.

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

5777 RELATIVE AND ABSOLUTE GOBLET CELL NUMBERS IN INTESTINAL CRYPTS FOLLOWING IRRADIATION OR ACTINOMYCIN D. *(E.)* Cooper, J. W. (Allegheny Gen. Hosp., Pittsburgh, Pa.). *Experientia* 30(5):549-550, 1974.

5778 ABSENCE OF DILATED LATERAL INTERCELLULAR SPACES IN FLUID-TRANSPORTING FROG GALLBLADDER EPITHELIUM. DIRECT MICROSCOPY OBSERVATIONS. *(E.)* Frederiksen, O.; Rostgaard, J. (Inst. Exp. Med., Univ. Copenhagen, Denmark). *J. Cell Biol.* 61(3):830-834, 1974.

See also, 5831, 5970, 6178, 6237, 6255.

ABSORPTION—EXCRETION—TRANSPORT

5779 EFFECT OF ACUTE ETHANOL ADMINISTRATION ON DUODENAL CALCIUM TRANSPORT. *(E.)* Krawitt, E. L. (Dept. Med., Univ. Vermont, Burlington). *Proc. Soc. Exp. Biol. Med.* 146(2):406-408, 1974.

The effects of the acute administration of high concentrations of ethanol on calcium transport by the rat duodenum was investigated using *in vitro* everted gut sac technique. Albino male Sprague-Dawley rats were starved 24 hr before experimentation. One hr after administration of a large dose of ethanol (7.5 g/kg) intragastrically, there was a significant decrease in the ability of duodenal gut sacs to transport calcium, while no effect was apparent after i.p. administration (5.0 g/kg). The duodenum from rats which had received intragastric ethanol demonstrated necrosis of the villous epithelium and infiltration of the lymphocytes and plasma cells in the remaining crypts. No changes were seen after intragastric glucose administration or after i.p. administration of ethanol. When added directly to the incubation systems, concentratons of 0.1% and 1.0% ethanol did not diminish transport ratios, while a 1.5% solution significantly inhibited calcium transport by the duodenal gut sacs. Histological examination of gut sacs after incubation in mannitol and 2.6% ethanol revealed destruction of villous architecture with sloughed and shrunken epithelial cells containing granular vaculated cytoplasm and pyknotic nuclei from the sacs. Similar but less striking changes were seen after incubation in 1.5% ethanol. The results suggest that the inhibition of calcium transport seen after acute administration of ethanol is the result of a direct toxic effect on the intestinal epithelium.

5780 MECHANISM AND SITE OF VITAMIN K-3 SMALL INTESTINAL TRANSPORT. *(E.)* Hollander, D.; Truscott, T. C. (Albany Med. Coll., N.Y.). *Am. J. Physiol.* 226(6):1516-1522, 1974.

To identify the mechanism of *in vitro* transport of vitamin K-3 and to localize the site of such absorption as to possible regional differences, the entire small intestine distal to the common bile duct of male Sprague-Dawley rats was excised and everted. Proximally and distally, 8.5 cm segments were incubated with 75-900 μM concentrations of micellar ^{14}C-labelled vitamin K-3 in solution. The transport rate was a linear function of the vitamin concentration up to 900 μM; at 300 μM, the absorption rate was 5.46 nM/min/100 mg of proximal intestine and 12.56 for the distal segment under O_2. These rates were not altered under N_2 or with the metabolic uncoupler 2,4-dinitrophenol, or in the absence of bile salts and fatty acids. Transport of the vitamin in a serosal-to-mucosal direction was also seen. No absorption occurred in the absence of a transmural concentration gradient. Results of all experiments showed a significantly greater transport of vitamin K-3 by the distal small bowel than by the proximal. This predilection for distal transport was shared by a C_8 fatty acid, octanoate, but a water-soluble compound, erythritol, was absorbed to a greater degree proximally, these 2 substances being used to check the possibility that greater distal transport of vitamin K-3 might be unique to the vitamin. In general, the findings indicate that small intestine transport of vitamin K-3 is due to a bidirectional passive diffusion process occurring more rapidly in the distal part.

5781 ABSORPTION AND PASSAGE OF FAT- AND WATER-SOLUBLE THIAMIN DERIVATIVES INTO ERYTHROCYTES AND CEREBROSPINAL FLUID OF MAN. *(E.)* Baker, H.; Thomson, A. D.; Frank, O.; Leevy, C. M. (New Jersey Med. Sch., East Orange). *Am. J. Clin. Nutr.* 27(7):676-680, 1974.

Results of a study to compare human absorption of 4 thiamin derivatives and their abilities to penetrate red blood cells *in vivo* as well as to pass into the cerebrospinal fluid are presented. The compounds, lipid-soluble thiamin propyl disulfide and thiamin tetrahydrofurfuryl disulfide, and water-soluble thiamin hydrochloride and thiamin pyrophosphate, all showed full thiamin activity with the Ochromonas danica growth test. At weekly intervals, 24 healthy subjects (aged 30-50) were given 50 mg. p.o. or i.v. of a different form of thiamin, and the same procedures for analysis were followed each time. Oral administration of thiamin propyl disulfide and thiamin tetrahydrofurfuryl disulfide caused a significant increase in thiamin activity in whole blood, RBC and cerebrospinal fluid, equivalent to that produced by i.v. administration of the water-soluble thiamin hydrochloride and thiamin pyrophosphate. In contrast, oral administration of the water-soluble thiamins did not significantly elevate thiamin, probably due to their rate-limited intestinal transport. The garlic-like odor of thiamin propyl disulfide limits its usefulness in multivitamins and food fortification, but thiamin tetrahydrofurfuryl disulfide is odorless and therefore more useful. In addition, the lack of toxicity and high oral effectiveness of the fat-soluble thiamins should make them preferable to the water-soluble forms for treating thiamin deficits associated with malnutrition, liver disease, beriberi, and alcoholic cerebellar-cortical degeneration.

5782 SITE OF BILIARY PHOSPHOLIPID ABSORPTION IN THE SMALL INTESTINE OF THE RAT. *(E.)* Ulrich, C.; Boucrot, P.; Clement, J. (Animal Physiol. Nutr. Lab., Dijon, France). *Biochimie* 56(3):429-434, 1974.

Isolated phospholipids labeled with ^{14}C-1-oleic acid and biliary lipids labeled with ^{3}H,9-10-oleic acid were both perfused into the duodenum of 2 male Wistar rats. In one experiment fresh bile was introduced; while in two additional experiments bile lipids according to the Delsal or Folch methods were used. The radioactivity recovered in the lumen and the mucosa lipids of 3 intestinal segments (upper, middle, and lower) was measured. In any case, the ^{14}C and ^{3}H radioactivity was mainly recovered along the upper and middle segments. When the perfused phospholipids were isolated, ^{14}C and ^{3}H fatty acids and ^{14}C and ^{3}H triglycerides appeared in the lumen and mucosa, resp., but, when the mixture contained tritiated bile, the ^{3}H radioactivity was recovered mainly as phospholipids in the upper and middle segments of the small intestine. These studies demonstrated that the bile ^{3}H phospholipids and the isolated ^{14}C phospholipids were both absorbed by the upper and middle segments of the small intestine and that biliary phospholipids and biliary salts were not simultaneously absorbed in the ileum. This obviously suggests the disorganization of the biliary complex in the small intestinal lumen.

5783 THEORETICAL MODEL STUDIES OF INTESTINAL DRUG ABSORPTION IV: BILE ACID TRANSPORT AT PREMICELLAR CONCENTRATIONS ACROSS DIFFUSION LAYER-MEMBRANE BARRIER. *(E.)* Ho, N. F. H.; Higuchi, W. I. (Coll. Pharm., Univ. Michigan, Ann Arbor). *J. Pharm. Sci.* 63(5):686-690, 1974.

Based on the first principles of transport, thermodynamics, and various biological and physico-chemical relations known about the transport of bile acids in dilute solutions, a general physical model using mathematics is described for the simultaneous active and passive transport of conjugated and unconjugated bile acids from nonmicellar solutions in the ileum. It reduces to the passive absorption mechanism in the duodenum and jejunum. The model provides the basis for experimental design of *in situ* studies and the quantification of physically meaningful and experimentally accessible transport parameters and of the effect of functional groups on bile acids. The interaction and factorization of (a) the permeability of the stagnant water layer, the lipoidal and aqueous channel pathway of the membrane according to the diffusion mechanisms; (b) the permeability of the membrane according to the active mechanism; (c) the bile acid concentration dependence; and (d) the pH and pKa are mathematically explicit. Theoretical computations indicate that the stagnant water layer may be the rate-determining barrier. A model is also described for the first-pass absorption of bile acids from dilute solutions in the small intestine.

5784 STUDIES ON THE TRANSPORT OF GLUCOSE FROM DISACCHARIDES BY HAMSTER SMALL INTESTINE IN VITRO. II. CHARACTERISTICS OF THE DISACCHARIDASE-RELATED TRANSPORT SYSTEM. *(E.)* Ramaswamy, K.; Malathi, P.; Caspary, W. F.; Crane, R. K. (Rutgers Med. Sch., Piscataway, N.J.) *Biochim. Biophys. Acta* 345(1):39-48, 1974.

Disaccharidase-associated transport of glucose from sucrase was investigated in the hamster small intestine. Two kinds of intestinal preparations were used for studies of uptake, namely, rings of everted intestine and everted sacs tied to polyethylene tubing. Results obtained with the latter preparation were deemed clearer since access of substrate to the serosal surface and possible hydrolysis by an internal disaccharidase was thereby prevented. Incubations were generally carried out with high ratios of medium to tissue (50 ml to 0.3 g), at high shaking rates (200 cycles/min), and for short time periods (2 min) to minimize build-up of high concentrations of glucose at the tissue surface and in the medium. For the Na^{+}-free Krebs-Ringer buffer used, choline chloride was substituted for NaCl and potassium phosphate for sodium phosphate. The transport of glucose from sucrose was found to be substantially independent of Na^{+}, thus differing from the Na^{+}-dependent transport of monosaccharide. In the absence of Na^{+}, glucose released from sucrose did not mix with a pool of added free glucose but was directly transferred. Maltose, isomaltose, and trehalose acted similiarly to sucrose. Both monosaccharides released from sucrose were transferred. The extent of uptake was not related to total sucrase activity. The explanation was offered that brush border disccharidases subserve a translocating "carrier" function and that the enzymes are organized in the membrane in such a way that they can accept substrate on one side of the membrane and deliver a part of the product on the other.

5785 ABSORPTION OF AMINO ACIDS IN MALNOURISHED RATS. *(E.)* Wapnir, R. A.; Lifshitz, F. (North Shore Univ. Hosp., Manhasset, N.Y.). *J. Nutr.* 104(7):843-849, 1974.

The absorption of amino acids in young Wistar rats fed protein and protein-energy deficient diets was studied *in vivo* using a perfusion technique of intestinal segments. The diets had the following composition: A) 18% protein, 69% carbohydrate, and 8% fat (CTL); B) 4% protein, 14% cellulose, and no changes in other constituents (LPR); C) 4% protein, 56.5% carbohydrate, and 26.5% cellulose (LPC). The LPR and LPC rats failed to gain weight and became hypoproteinemic after feeding the diets for 4 weeks. At the end of this period, the intestinal transport of tyrosine was higher in the LPR and LPC rats as compared with the CTL animals. The lumen-to-blood flow of ^{3}H-tyrosine was also increased in LPR and LPC rats. However, the uptake of this amino acid by the soluble and protein-bound extracts of the intestinal mucosa was not altered, and there was no relation between the absorption of tyrosine and the free amino acid levels of the intestinal mucosa. The intestinal absorption of tyrosine was inversely correlated with the circulating blood levels. The intestinal transport of leucine was also elevated in malnourished animals, but whole blood levels of this amino acid were unchanged. The intestinal transport rates of phenylalanine and glycine were not altered, although glycinemia was elevated in both LPR and LPC rats. The absorption of lysine was lower in the LPR group while blood levels were not modified. The results of this study suggest that in malnourished rats, the intestinal transport of certain neutral amino acids such as tyrosine may be inversely correlated with its concentration in the circulation. However, there was no such correlation for glycine, leucine and lysine.

5786 TRANSPORT OF L-METHIONINE IN RAT INTESTINE AND KIDNEY. *(E.)* Bartsocas, C. S.; Thier, S. O.; Crawford, J. D. (Massachusetts Gen. Hosp., Boston). *Pediatr. Res.* 3(6):673-678, 1974.

L-Methionine transport was studied *in vitro* in kidney cortex slices and intestinal segments from male Sprague-Dawley rats. In both tissues L-^{14}C-methionine (0.065 mM) was accumulated against a chemical concentration gradient by processes which obeyed saturation kinetics. In both tissues anerobic conditions inhibited methionine accumulation. The processes were sodium dependent. Addition of sucrose (0.3 M) produced significant inhibition of L-methionine accumulation in the kidney. L-Methionine transport was essentially independent of pH. With the exception of valine and ethionine, amino acids representative of the neutral, dibasic, and imino groups did not inhibit methionine transport at 2.4 mM concentrations. Valine was a potent inhibitor of transport in the intestine and ethionine of uptake in the kidney. Methionine inhibited glycine accumulation in kidney and intestine but did not affect lysine transport in either tissue. These data indicate that methionine uptake in the gut and kidney has the characteristics of an active transport process that is unaffected by most other amino acids. It is also suggested that methionine is transported by an independent mechanism or by a transport system shared with other neutral amino acids but for which it has a much higher affinity.

5787 DIGESTA PASSAGE AND WATER EXCHANGE IN THE EQUINE LARGE INTESTINE. *(E.)* Argenzio, R. A.; Lowe, J. E.; Pickard, D. W.; Stevens, C. E. (New York State Vet. Coll., Cornell Univ., Ithaca). *Am. J. Physiol.* 226(5):1035-1042, 1974.

Digesta flow and water absorption were studied in 48 Shetland ponies fed a conventional diet or a high-cellulose, low-protein diet with added soluble carbohydrates, minerals, and vitamins which was designed to maximize microbial digestion. Animals were fed 2 meals/day at 12 hr intervals. Liquid markers (polyethylene glycol and ^{51}Cr-ethylenediaminetetraacetic acid) and particulate markers (radiopaque polyethylene tubing) were administered during the morning meal *via* stomach tube, cecal fistula, or dorsal colonic fistula. Following sacrifice of the animals at various times up to 48 hr after marker administration, 12 digestive tract segments were separately analyzed for water, marker content, and osmolality. In control animals the greatest percentage of liquid marker had reached the cecum 2 hr after its administration, while 75% of particulate markers still remained in the stomach. In animals on the experimental diet, small intestinal transit of marker was significantly slower, but differences between the 2 groups in large intestinal transit were not significant by 8 hr after feeding. Both fluid and particulate markers rapidly left the cecum and passed into the large ventral dorsal colon where major retention occurred. Markers accumulated rapidly in both the right and left ventral colon. They were released at a slower rate into the dorsal colon, suggesting that the ventral-dorsal colonic junction is a major barrier to digesta flow. Slow release of markers from the dorsal colon indicated that its termination is another major barrier to outflow. In animals fed the conventional diet, large, cyclic exchanges of water occurred between digesta and plasma and were associated with changes in osmotic gradients. The daily volume of water entering the large intestine from the small bowel, plus that entering *via* the large intestinal mucosa was equal to total extracellular fluid volume. Of this, 95% was reabsorbed. Net daily absorption of water in the cecum of animals on the experimental diet was 1/3 that of controls. This decrease was accompanied by a 65% increase in net absorption of water from the ventral and small colons and a 50% decrease in net water secretion into the dorsal colon. Diarrhea was apparently prevented by compensatory changes which took place in the colon. It is noted that the cecum of the pony differs from that of the rabbit which retains fluid marker for long periods and can selectively reject particulate markers. Further, there is apparently no retrograde movement of markers from the proximal colon into the cecum of the pony.

5788 IN VIVO INTESTINAL ABSORPTION OF HEXOSE IN GROWTH-RETARDED SUCKLING RAT PUPS. *(E.)* Younoszai, M. K.; Lynch, A. (Dept. Pediatr., Univ. Iowa, Iowa City). *J. Nutr.* 104(6):671-677, 1974.

The possible effects of malnutrition during infancy on growth retardation were investigated in Holtzman rats. Growth retardation was induced by increasing the litter size from 16 to 18 pups on the second day after delivery. Absorption of 3-*O*-methyl-D-glucose was measured in the jejunum plus ileum of growth retarded and control pups using an *in vivo* perfusion technique under steady state conditions. At 7 to 8 days of age the size of the jejunum + ileum and mean rate of absorption of 3-*O*-methyl-D-glucose normalized for intestinal size were similar in growth retarded and control pups, 65 and 54 mg/g jejunum + ileum dry weight/hr, resp. At 14 to 15 days, although intestinal size was smaller in growth retarded than in control animals, the rate of absorption of 3-*O*-methyl-D-glucose was about 2-fold and significantly higher in growth retarded than control pups, 126 and 74 mg/g jejunum + ileum dry weight/hr, resp. At 21 and 22 days, submaximal absorption rates from a 10 mg/ml solution were similar in growth retarded and control animals 225 and 222, resp., but from a 15 mg/ml solution the value was significantly lower in growth retarded than in control pups, 240 vs 295, resp. The results suggest several conclusions. The decreased total amount and somewhat lower rate of hexose absorption in the growth retarded pups may be contributing factors toward perpetuation of growth retardation. As in the intestine of the adult malnourished rat, the specific activity of hexose absorption seems also to be enhanced transiently in the intestine of growth-retarded rat pups. The somewhat higher intestinal tissue concentrations of 3-*O*-methyl-D-glucose in the growth retarded pups were probably due to higher mean luminal 3-*O*-methyl-D-glucose concentration in these pups. Plasma concentrations of 3-*O*-methyl-D-glucose were similar in the 2 groups. Thus, in these *in vivo* studies, tissue and plasma 3-*O*-methyl-D-glucose concentrations did not correlate well with the 3-*O*-methyl-D-glucose absorption rates. Growth retardation did not appear to have any effect on intestinal water absorption.

5789 THE MECHANISM OF INTESTINAL ABSORPTION OF PHOSPHATIDYLCHOLINE IN RATS. *(E.)* Parthasarathy, S.; Subbaiah, P. V.; Ganguly, J. (Indian Inst. Sci., Bangalore, India). *Biochem. J.* 140(3): 503-508, 1974.

Phosphatidylcholine (20 µM) specifically labeled in the fatty acid or in the glycerol moiety or with ^{32}P was injected into the intestine of rats. Compared with the 1-([^{14}C]acyl) derivative, 2-([^{14}C] acyl) phosphatidylcholine gave more radioactive unesterified fatty acids and correspondingly less radioactive lysophosphatidylcholine in the lumen as well as in the mucosa. Both compounds led to the appearance of significant amounts of radioactive triacylglycerols in the mucosa. Injection of ^{32}P-phosphatidylcholine or ^{32}P-lysophosphatidylcholine resulted in the appearance of radioactive glycerylphosphorylcholine, glycerophosphate, and Pi in the mucosa. Compared with the radioactivity of phosphatidylcholine, that of lysophosphatidylcholine virtually disappeared from the lumen. Glycerylphosphorylcholine diesterase was highly active in the mucosa and was concentrated in the microsomal fractions or in the brush-border free particulate materials of the mucosal cell. It is concluded that dietary phosphatidylcholine is hydrolyzed in the intestinal lumen by the pancreatic phospholipase A to 1-acylglycerylphosphorylcholine, which on entering the mucosal cell is partly reacylated to phosphatidylcholine while the rest is further hydrolyzed to glycerylphosphorylcholine, glycerophosphate, glycerol, and Pi. The fatty acids and glycerophosphate are then reassembled to give triacylglycerols *via* the Kennedy (1961) pathway.

5790 EFFECTS OF WATER INTAKE ON INTESTINAL ABSORPTION AND MOTILITY IN THE WATER-DEPRIVED DOG. *(Fr.)* Ardisson, J. L.; Smutek, V.; Catier, J.; Dolisi, C.; Gastaud, M. (U.E.R. Med., Marseille, France). *J. Physiol. (Paris)* 68(1):27-35, 1974.

5791 WATER AND SODIUM TRANSPORT IN ISOLATED INTESTINE OF Salmo irideus DURING ADAPTATION TO SEA WATER. *(Fr.)* Bensahla-Talet, A.; Porthe-Nibelle, J.; Lahlou, B. (Lab. Comparative Physiol., Fac. Sci., Univ. Nice, France). *C. R. Acad. Sci. [D] (Paris)* 278:2541-2544, 1974.

5792 BIOPHARMACEUTICAL STUDY OF THE HEPATOBILIARY TRANSPORT OF DRUGS. I. HEPATOBILIARY TRANSPORT OF NON-METABOLIZING ORGANIC ANIONIC COMPOUNDS IN RAT. *(E.)* Takada, K.; Mizobuchi, Y.; Muranishi, S. (Fac. Pharm. Sci., Kyoto Univ., Japan). *Chem. Pharm. Bull.* 22(4):922-929, 1974.

5793 FACTORS INFLUENCING ABSORPTION AND EXCRETION OF DRUGS. II. EFFECT OF POTASSIUM ION ON IN SITU RAT INTESTINAL ABSORPTION OF SEVERAL DRUGS. *(E.)* Kojima, S.; Tenmizu, T.; Shino, T.; Cho, M. (Fac. Pharm. Sci., Kumamoto Univ., Japan). *Chem. Pharm. Bull.* 22(4):952-957, 1974.

5794 EFFECT OF DOSING TECHNIQUE ON ABSORPTION OF CARBARYL. *(E.)* Pekas, J. C.; Giles, J. L. (Metab. Radiat. Res. Lab., Fargo, N. D.). *Food Cosmet. Toxicol.* 12(1):169, 1974.

5795 EFFECTS OF PESTICIDES ON ACTIVE TRANSPORT OF GLUCOSE THROUGH THE ISOLATED INTESTINE OF THE MOUSE. *(E.)* Guthrie, F. E.; Shah, P. V.; Moreland, D. E. (Dept. Entomol., North Carolina State Univ., Raleigh). *J. Agr. Food Chem.* 22(4):713-715, 1974.

5796 EFFECT OF BILE SALTS ON PARTITIONING AND ORAL TOXICITY OF THE BISQUATERNARY AMMONIUM DRUG DECAMETHONIUM BROMIDE. *(E.)* Gaginella, T. S.; Perrin, J. H.; Vallner, J. J.; Bass, P. (Sch. Pharm., Univ. Wisconsin, Madison). *J. Pharm. Sci.* 63(5):790-792, 1974.

See also, 5857, 5869, 5954, 5956, 5987, 6178.

MOTILITY

5797 INTESTINAL EFFECTS OF 5-HYDROXYTRYPTAMINE AND MORPHINE IN GUINEA PIGS, DOGS, CATS AND MONKEYS. *(E.)* Pruitt, D. B.; Grubb, M. N.; Jaquette, D. L.; Burks, T. F. (Univ. Texas Med. Sch., Houston). *Eur. J. Pharmacol.* 26(2):298-305, 1974.

Although evidence has been advanced that the intestinal stimulatory effects of morphine are mediated in the dog largely by release of endogenous 5-hydroxytryptamine (5-HT), in the guinea pig morphine antagonizes the intestinal stimulatory properties of 5-HT. To determine whether the inhibitory effect of morphine on intestinal responses to 5-HT is unique to the guinea pig, studies were carried out in guinea pigs, dogs, cats, and monkeys. Intestinal intraluminal pressures were measured after i.v. administration of 100 μg/kg 5-HT and also after administration of 100 μg/kg morphine followed by 100 μg/kg 5-HT. In guinea pigs, but not in the other species, the intestinal stimulatory effect of 5-HT was antagonized by morphine. Since the nervous structures in the guinea pig are easily blocked by 5-HT itself and by a wide variety of narcotic drugs, it is concluded that the neuronal 5-HT receptors or the postganglionic neural elements in the guinea pig intestine are somehow different from analogous elements in other species.

5798 INTERACTIVE GRAPHICS ANALYSIS OF GASTROINTESTINAL ELECTRICAL SIGNALS. *(E.)* Linkens, D. A.; Cannell, A. E. (Dept. Control Engineer., Univ. Birmingham, England). *IEEE Trans. Biomed. Eng.* BME-21(4):335-339, 1974.

A set of conversational correlation and spectral computer programs for analysis of slow waves from human and canine digestive tracts is described. The data analyzed comprise electrical signals obtained from either the inside or outside walls of the stomach and small and large bowels. The basic rhythm is a low-frequency wave of about 0.05 Hz in the stomach and 0.2 Hz in the duodenum of man, and about 0.1 Hz in the stomach and 0.3 Hz in the duodenum of dogs. Interactive analysis makes it possible to accurately investigate changes in phase shifts and frequency spectra caused by drug stimulation, pyloroplasty, and different types of vagotomy.

5799 THE EFFECT OF GASTRIC DISTENTION ON GASTRIC MOTILITY AND SERUM GASTRIN IN ACUTELY VAGOTOMIZED PIGS. *(E.)* Stadaas, J.; Schrumpf, E.; Haffner, J. F. W. (Ulleval Univ. Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(2):127-131, 1974.

Gastric motility and gastrin release after stepwise gastric distention were measured before and after vagotomy in pigs. Motility recordings were obtained separately from the antral and fundal portions of the stomach by sectioning the organ. The effects of gastric distention were significantly altered after vagal denervation. Increases in serum gastrin and antral peristalsis seen after stepwise distention were diminished after vagotomy. Basal pressure increments were more marked in the antral as well as the fundal portions of the stomach, and the fundal and antral adaptation times were prolonged after vagal denervation. The data indicate that vagotomy alters motility in both the distal and proximal parts of the stomach, suggesting that even proximal vagotomy produces changes in gastric motor function. In addition, intact antral innervation appears to be necessary for normal gastrin release after distention.

5800 CORRELATIONS BETWEEN ELECTROLYTE CONTENT AND SPONTANEOUS ELECTRICAL ACTIVITY IN INTESTINAL MUSCLE. *(E.)* Job, D. D.; Bloomquist, W. E.; Bridgeforth, J. (Eli Lilly Co. Res. Lab., Indianapolis, Ind.). *Am. J. Physiol.* 226(6):1502-1509, 1974.

Spontaneous *in vitro* electrical activity was recorded from five different regions of cat small intestine. The electrolyte content was determined in these same pieces of tissue. Gradients in slow-wave frequency (SWF) and "apparent" slow-wave conduction time (SWC) were observed down the intestine. Correlations between ion levels and electrical parameters and correlations between electrical parameters themselves were computed. Slow-wave amplitude (SWA) was negatively correlated with both tissue sodium and calcium. Spike amplitude was negatively correlated with tissue calcium and sodium and positively correlated to potassium. The latter was the strongest of the three. Spike frequency was negatively correlated with chloride. Slow wave and spike conduction were not highly correlated to any ions. SWF was not correlated with any ion which exhibited a significant gradient, indicating that the gradient in intestinal motor activity was not primarily ionic in origin. A positive correlation between SWA and SWF was the most prominent interaction among electrical parameters. Most interactions between electrical parameters were insignificant. Most correlations between ion levels and electrical parameters were below .50, suggesting that the bulk-phase ion distribution is not the primary determinant of the spontaneous electrical activity.

5801 ELECTROMYOGRAPHIC STUDY OF THE SPHINCTER OF ODDI. I. TECHNIQUE AND IN VIVO AND IN VITRO RESULTS FROM RABBITS. *(Fr.)* Sarles, J. C.; Midejean, A.; Gayne, F. (Res. Unit. Dig. Dis., Marseille, France). *Biol. Gastroenterol. (Paris)* 7(1):19-27, 1974.

A technique was developed by which simultaneous recordings could be made of electrical activity in the sphincter of Oddi and of pressure fluctuations within the common bile duct. *In vitro* experiments were performed on 20 rabbits. Measurements made in the sphincter of Oddi, isolated from the duodenum, showed salvos of 3-7 spike potentials varying from about 12-200 microvolts in amplitude and lasting for 1-2 sec. The intervals between these salvos lasted 3-15 sec (average of 5 sec). Each salvo corresponded to an increase of pressure within the common bile duct. These pressure increases ranged from 1-23 cm H_2O and were proportional to the frequency and amplitude of spike potentials in the biliary tract. Similar results were obtained with the sphincter of Oddi when it was not isolated from the duodenum. No correlation was found between electrical activity in the duodenum and pressure increases in the biliary tract. *In vivo* studies performed on 50 fasted rabbits anesthetized with pentobarbital sodium revealed salvos of 1-8 spike potentials separated by intervals of 1-10 sec (average of 3-5 sec) in the sphincter of Oddi. Biliary pressure increased immediately after these salvos. Duodenal spike potentials had a different rhythm from those recorded in the sphincter of Oddi and they were not accompanied by increases in biliary tract pressure. Electrical activity in the sphincter of Oddi was also shown to be independent of ECG tracings and respiratory movements when the rabbits were properly anesthetized. These findings differ from others reported in the literature in which electrical activity in the duodenum and sphincter of Oddi coincided. This difference may be due to anatomical differences in the experimental animals employed. Rabbits were chosen for this investigation because their sphincter of Oddi is independent of the duodenal musculature.

5802 EFFECT OF GASTRIC FUNDECTOMY ON CANINE GASTRIC ELECTRICAL AND MOTOR ACTIVITY. *(E.)* Wilbur, B. G.; Kelly, K. A.; Code, C. F. (Mayo Med. Sch., Rochester, Minn.). *Am. J. Physiol.* 226(6):1445-1449, 1974.

In five dogs with implanted gastric electrodes, the mean frequency of the gastric pacesetter potential (PP) decreased before fundectomy from 5.0 to 4.2 cycles/min within 1 min after instillation of 400 ml of 154 mM NaCl and then gradually returned toward control. By 10 min, a mean of 131 ml of saline had emptied from the stomach. Mean gastric transmural pressure increased from 1.5 to 9.8 cm H_2O with gastric distention from 0 to 400 ml but did not increase further with continued distention to 800 ml. In identical tests after fundectomy, a greater decrease in frequency of the PP occurred with instillation of saline (mean decrease, 2.4 cycles/min), gastric emptying of instilled saline was faster (mean volume emptied in 10 min, 251 ml), and greater increases in pressure resulted from gastric distention (mean pressure at 400 ml, 17.6 cm H_2O). Vomiting occurred with 600 or 700 ml. Results show that the fundus acts as a reservoir and participates in the control of gastric emptying of instilled saline by regulating intragastric pressure.

5803 INFLUENCE OF FAT AND FLUORIDE ON GASTRIC EMPTYING OF RATS. *(E.)* McGown, E. L.; Suttie, J. W. (Dept. Biochem., Univ. Wisconsin, Madison). *J. Nutr.* 104(7):909-915, 1974.

An increase of dietary fat from 5 to 25.5% (35% of nutrients) markedly enhanced the growth-depressing action of dietary fluoride (600 ppm) in female Sprague-Dawley rats. Two separate p.o. doses of 1 mg fluoride caused a 14-hr lag in $^{14}CO_2$ production from ^{14}C-tripalmitin in a corn oil test meal. Fluoride also delayed $^{14}CO_2$ production from ^{14}C-palmitate; this experiment indicated that depressed intraluminal lipolysis did not account for the effect of fluoride on ^{14}C-tripalmitin metabolism. By monitoring the passage of several ^{14}C-substrates through the gastrointestinal tract, fluoride in the presence of fat was found to delay gastric emptying. After a labeled test meal of 0.65 g corn oil, the percentage of radioactivity remaining in the stomach of the fluoride-treated (1 mg) animals was 80 and 73% at 3 and 5 hr, resp., compared with 24 and 6% in controls. When rats were given test meals of a semipurified diet containing 35% corn oil, fluoride again caused a striking delay in disappearance of radioactivity: 79 and 64% of radioactivity remained at 3 and 5 hr, resp., compared with 40 and 39% in controls. With fat-free meals, there was a slight effect of fluoride at 1 hr (42% radioactivity remaining), but no difference from controls at 3 hr. The effect of fluoride on gastric emptying could account for the increased toxicity of fluoride to rats fed high-fat diets.

5804 A POSSIBLE ORIGIN OF INTESTINAL GRADIENTS AND THEIR RELATION TO MOTILITY. *(E.)* Job, D. D.; Griffing, W. J.; Rodda, B. E. (Lilly Res. Lab., Eli Lilly Co., Indianapolis, Ind.) *Am. J. Physiol.* 226(6):1510-1515, 1974.

In an effort to determine whether degree of interaction between mitochondria and plasma membrane could be related to slow-wave frequency in the intestine, sections of longitudinal muscle from the proximal jejunum and distal ileum of the cat were examined quantitatively by the electron microscope. Mitochondria were found to be clustered near the plasma membrane or near the nucleus. Of those near the membrane, the ones in the ileum were, on the average, 5 times farther from the membrane than were the ones in the jejunum. These differences alone were believed to be sufficient to account for the slower frequency of electrical slow waves observed in the ileum. The greater diameter observed for cells in ileal sections also could account for slower slow-wave conduction. It was proposed that closeness of mitochondria to plasma membrane may determine the rate at which ATP and ADP are recycled between the 2, and that this affects the frequency of intestinal slow waves. Finally, more mitochondria per micrometer of perimeter were found in jejunum than in ileum, and this suggested that the total energy output is greater in the former, therby accounting for metabolic gradients seen in the small intestine, relating to level of oxygen consumption, level of ATP, and level of various enzymes and transmitters.

5805 STUDIES OF GASTROINTESTINAL INTERACTIONS. VI. INTESTINAL FLOW, MEAN TRANSIT TIME, AND MIXING AFTER COMPOSITE MEALS IN MAN. *(E.)* Lagerlof, H. O.; Johansson, C.; Ekelund, K. (Karolinska Hosp., Stockholm, Sweden). *Scand. J. Gastroenterol.* 9(3):261-270, 1974.

The postprandial flow in the jejunum was investigated with a multiple indicator dilution technique by which the changes in transit times of the intestinal contents were considered. Two composite meals, which differed in their glucose content, were fed to 7 healthy subjects on different occasions. One meal contained 3.6 g protein, 5.1 g lactose, 5.9 g corn oil, and 3.0 polyethylene glycol/100 ml. The other meal contained in addition 10 g glucose/100 ml. Despite a pronounced lower gastric emptying rate of the meal containing glucose, the flow volumes in jejunum were similar after the meals, owing to a dilution of the hypertonic meal during intestinal transit. A flow volume of about 500 ml had passed at the investigated jejunal level after 3 hr. Flow rates of about 2 ml/min persisted after 2 hr. The transit times of the intestinal contents did not differ significantly between the meals, irrespective of the differences in gastric emptying rates. The mean transit time increased during the first hr after ingestion, and undulated thereafter between 20 to 40 min in the individual experiments. Based on the assumption of a constant velocity of the indicator particles, the transit of the indicator through the entire intestine could be estimated, as could the distribution of test meal marker in consecutive segments of the intestine.

5806 HYPOTONIC ROENTGENOGRAPHY WITH GLUCAGON. *(E.)* Miller, R. E.; Chernish, S. M.; Skucas, J.; Rosenak, B. D.; Rodda, B. E. (Indiana Univ. Sch. Med., Indianapolis). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(2):264-274, 1974.

In a hypotonic gastrointestinal study, 24 asymptomatic men (aged 20-54 yr) were divided into 2 groups of 12 each. In one group glucagon (2 mg) was compared with placebo and atropine sulfate (1 mg). In the 2nd group, glucagon was compared with placebo and propantheline bromide (30 mg). Drugs were given i.m., double-blind, and crossover. Glucagon decreased the motility and tonicity of the stomach and duodenum to a significantly greater degree than placebo at 10 and 30 min. At 60 min the effects of glucagon differed little from those of placebo. Stomach and small intestine tonicity and motility were significantly decreased at 10, 30, and 60 min following atropine sulfate and propantheline bromide. Tonicity and motility of the duodenal bulb at 60 min and the duodenal loop at 30 and 60 min were also decreased following administration of the anticholinergics. Glucagon was significantly better than either anticholinergic for roentgenographic examination of the stomach, duodenal bulb, and duodenal loop. Side effects of propantheline bromide included dryness of the mouth (all 12 subjects), nausea (5), headaches (6), and urinary retention (10). The most frequent side effects of atropine were dryness of the mouth (8 cases) and nausea (3). Glucagon caused nausea (average of 7.5 reports) and vomiting (average of 4.5 reports), but these side effects lasted only 5-10 min.

5807 STUDIES ON THE NECESSITY OF A BOLUS FOR THE PROGRESSION OF SECONDARY PERISTALSIS IN THE CANINE ESOPHAGUS. *(E.)* Janssens, J.; Valembois, P.; Hellemans, J.; Vantrappen, G.; Pelemans, W. (Gastrointest. Dis. Lab., Leuven, Belgium). *Gastroenterology* 67(2):245-251, 1974.

An investigation was made to determine whether the progression of secondary esophageal contractions depends upon the presence of an intraluminal bolus. Without interfering with the vagal innervation, transection of the esophagus with bolus deviation was performed in dogs both at the cervical and at the thoracic level. If the instilled bolus (5-10 ml of water) was deviated at the cervical level, a secondary wave elicited in the upper part of the gullet was not able to progress in a peristaltic manner. However, in the thoracic esophagus, the bolus was not required for normal peristaltic progression of the secondary contraction. Secondary peristaltic contractions elicited below a cervical or a thoracic transection frequently started in the esophageal segment above the transection level in the absence of any bolus. These results suggest that in the canine esophagus, the progression of secondary peristaltic contractions is regulated in the same manner as primary peristalsis, i.e. by the cooperation of at least two mechanisms: the central regulating mechanism in the brain stem, and afferent information originating in the esophageal wall from the presence of an intraluminal bolus. The bolus is a prerequisite at the cervical level, but not at the thoracic level, although even in the thoracic gullet the peristaltic progression of the secondary contraction is improved by the presence of a bolus.

5808 PRESYNAPTIC INHIBITION AT MAMMALIAN PERIPHERAL SYNAPSE? *(E.)* Hirst, G. D. S.; McKirdy, H. C. (Dept. Physiol., Monash Univ., Clayton, Australia). *Nature (Lond.)* 250(5465):430-431, 1974.

Intracellular recordings were made from myenteric neurons in flaps of plexus attached to the distal end of an adjacent segment of guinea pig mid small intestine. The periarterial nerves leading to the intestinal segment were drawn into a suction electrode and stimulated electrically. Synaptic activity was evoked in the myenteric plexus by use of a pair of fine platinum electrodes with one under and the other just above the plexus flap. Synaptic activity was also evoked by distending a balloon placed inside the lumen of the gut segment. In most experiments, trains of 10-100 stimuli applied to periarterial nerves produced no change in the electrical properties of the myenteric neurons. Transmural stimulation of the flap of myenteric plexus never evoked inhibitory postsynaptic potentials. An intermittent discharge of excitatory postsynaptic potentials was recorded from some neurons in the absence of any apparent stimulus. Close transmural stimulation evoked a single excitatory postsynaptic potential or a cluster of excitatory postsynaptic potentials. A preceding train of stimuli applied to periarterial nerves either abolished the synaptic response or reduced the number of excitatory postsynaptic potentials in the cluster. When intracellular recordings were made from longitudinal or circular muscle, trains of stimuli (20 Hz for 5 sec) applied to periarterial nerves produced no detectable change in membrane potential of cells in longitudinal muscle, but they did cause detectable hyperpolarization of circular muscle membrane potential. These findings suggest that sympathetic inhibition is mediated presynaptically rather than by the postsynaptic action of inhibitory transmitter.

5809 DEVELOPMENTAL CHARACTERISTICS OF LOWER ESOPHAGEAL SPHINCTER FUNCTION: A POSSIBLE MECHANISM FOR INFANTILE CHALASIA. *(E.)* Cohen, S. (Hosp. Univ. Pennsylvania, Philadelphia). *Gastroenterology* 67(4):252-258, 1974.

The developmental characteristics of lower esophageal function were investigated in anesthetized opossums. At ages 35 days and 84 days opossums had mean lower esophageal sphincter pressures of 4.3 mm Hg and 12.6 mm Hg, resp., compared with 28 mm Hg in adult animals. Dose-response curves to gastrin I (0.1-4.0 μg/kg i.v.) were displaced to the right, and the maximum response was reduced in younger animals. The maximum percentage of lower esophageal sphincter response to norepinephrine (20 μg/kg i.v.) was similar in all animals. *In vitro* studies demonstrated that maximum responses of lower esophageal sphincter muscle to acetylcholine, norepinephrine, and potassium chloride depolarization were similar when the responses were corrected for differences in muscle weight. The response to gastrin I was reduced in muscle from younger animals. The results of these studies suggest that the reduced lower esophageal sphincter pressure in the young opossum is associated both with a smaller muscle mass and a reduced response to gastrin I. These developmental changes in lower esophageal sphincter may provide a physiological explanation for chalasia of infancy.

5810 EFFECT OF ETHANOL ON MOTILITY OF THE SMALL INTESTINE. *(E.)* Robles, E. A.; Mezey, E.; Halsted, C. H.; Schuster, M. M. (Baltimore City Hosp., Md.). *Johns Hopkins Med. J.* 135(1):17-24, 1974.

Intestinal motility was measured before and after administration of alcohol in 13 male volunteers, aged 25-46 yr. These subjects consisted of 2 normal controls and 11 chronic alcoholics with no clinical evidence of cirrhosis, peripheral neuropathy, or other complicating disease. Jejunal motility measurements were made before and after ingestion of 0.8 g/kg ethanol in orange juice or injection of the same dose i.v. as a 20% solution in saline. Another study of jejunal motility was performed after ingestion of a mixture of urea (24.8 g), glycine (31.0 g), and alanine (36.8 g) dissolved in 300 ml orange juice which was isotonic to the ethanol solution. Ileal motility was measured before and after ingestion of the above dose of ethanol. Administration of ethanol inhibited Type I wave activity in the jejunum and augmented Type III wave activity in the ileum. Since ethanol equilibrates rapidly in most tissues and intraluminal concentrations reached in the jejunum are similar to blood ethanol concentrations, these effects were independent of the route of administration. The effect of ethanol on small intestine motility appears to be specific and not the result of fluid load or of hypertonicity, because administration of an equal volume of plain orange juice did not change motility and administration of an equivalent hypertonic solution of urea and amino acids produced a totally different response, consisting of a more rapid and complete suppression of Type I wave activity than was seen with ethanol and inhibition of Type III wave activity. It is suggested that ethanol-induced inhibition of Type I (impeding) waves in the jejunum and stimulation of Type III (propulsive) waves in the ileum may contribute to the diarrhea which develops in binge-drinking alcoholics. Although 7 of the 11 alcoholics tested had histories of diarrhea associated with binge drinking, they did not develop diarrhea in these tests. This may be attributed to the fact that the patients were fasted and studied in the supine position. It is also possible that the diarrhea associated with binge drinking is aggravated by congeners present in alcoholic beverages but not in ethanol.

5811 THE ACTION MECHANISM OF RESTRAINT ON GASTRIC EMPTYING IN THE ALBINO RAT. II. SURGERY ON THE PNEUMOGASTRIC NERVE. *(Fr.)* Dumas, J. (Lab. Gen. Comparative Physiol., Claude Bernard Univ., Lyon, France). *C. R. Soc. Biol. (Paris)* 167(12): 1843-1846, 1974.

5812 THE PROPER FUNCTIONING OF THE SPHINCTER OF THE AMPULLA OF VATER. *(Pol.)* Poltorak, J. L. (Bielanski Gen. Hosp., Warsaw, Poland). *Wiad. Lek.* 27(1):31-36, 1974.

5813 COMPARISON OF THE EFFECT OF PANCREATIC GLUCAGON AND SECRETIN ON THE MOTILITY OF THE PROXIMAL AND DISTAL GASTROINTESTINAL TRACT IN MAN. *(Ger.)* Paul, F. (Med. Coll., Hanover, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79: 841-843, 1973.

5814 THE SIGNIFICANCE OF INHIBITORY NERVES FOR COLONIC MOTILITY. *(Ger.)* Wienbeck, M. (Med. Clin., Univ. Marburg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:850-851, 1973.

5815 EFFECTS OF INTERRELATIONS BETWEEN STIMULATION OF THE FRONTAL CORTEX AND THE HYPOTHALAMUS ON MOTOR ACTIVITY OF THE SMALL INTESTINE. *(Ukr.)* Dobrovol's'ka, Z. O. (Inst. Physiol., Kiev Univ., USSR). *Fiziol. Zh.* 19(6): 748-753, 1973.

5816 ON THE BIOELECTRIC ACTIVITY OF THE SMOOTH MUSCLES IN VARIOUS COMPARTMENTS OF THE RUMINANT STOMACH IN SHEEP. *(E.)* Stoyanov, I. N.; Radev, T. P.; Vassilev, V. I.; Polyanska, T. S.; Vesselinova, P. V. (Inst. Physiol, Sofia, Bulgaria). *Dokl. Bulg. Akad. Nauk* 27(2):259-262, 1974.

5817 INTESTINAL MOTOR EFFECTS OF A UNIQUE ANALGESIC AGENT. *(E.)* Jacobs, G. R.; Burks, T. F. (Univ. Texas Med. Sch., Houston). *J. Pharm. Sci.* 63(5):787-790, 1974.

5818 INCREASED DIAMINE OXIDASE ACTIVITY IN THE INTESTINAL LYMPH OF RATS ON FAT INGESTION. *(E.)* Wollin, A.; Jaques, L. B. (Univ. Saskatchewan Coll. Med., Saskatoon, Canada). *Can. J. Physiol. Pharmacol.* 52(3):760-762, 1974.

Diamine oxidase activity in the intestinal lymph of Wistar rats increased markedly shortly after p.o. administration of olive oil (2 ml/kg). This response was similar to that observed over a 4-hr period after i.p. injection of heparin (125 or 350 U/kg). Substitution of glucose solution (2 ml/kg) for olive oil did not produce this response. With repeated olive oil intubation on successive days, the enzyme activity levels became higher, reaching values on day 4 which were 6 times those of day 1. The increase was a combination of both higher lymph volumes and diamine oxidase activity per unit volume. When heparin and olive oil were administered together, an increase in diamine oxidase activity in the intestinal lymph was higher than the sum of the effects of separate treatments. It is suggested that the synergism may be related to the relatively unchanged lymph flow seen during heparin administration alone. Perhaps the combination treatment washed out more enzyme from the tissue because olive oil feeding increased lymph flow.

5819 NORADRENALINE IN THE GUINEA PIG ALIMENTARY CANAL: REGIONAL DISTRIBUTION AND SENSITIVITY TO DENERVATION AND RESERPINE. *(E.)* Juorio, A. V.; Gabella, G. (Dept. Anat., Univ. Coll. London, England). *J. Neurochem.* 22(5):851-858, 1974.

The concentrations of norepinephrine, dopamine, and 5-hydroxytryptamine were studied in the stomach, duodenum, ileum, cecum, colon, and rectum of the guinea pig. The wall of the alimentary canal was dissected into 2 fractions, one formed by the longitudinal muscle and myenteric plexus, the other formed by circular muscle, submucous plexus, submucosa, and mucosa. In the longitudinal muscle-myenteric plexus, the amount of norepinephrine was 0.56 μg/g fresh tissue in the ileum, 0.75 μg/g in the duodenum, 0.82 μg/g in the cecum, 0.85 μg/g in the stomach, 0.91 μg/g in the rectum, and 1.33 μg/g in the colon. The high value found in the colon was probably related to the occurrence of intramural adrenergic neurons. In the mucosa fraction, the concentration of norepinephrine increased steadily from 0.35 μg/g in the stomach to 0.72 μg/g in the rectum. The concentration of dopamine in the ileum was 0.06 μg/g for the longitudinal muscle-myenteric plexus and 0.07 μg/g for the mucosa component. The concentration of 5-hydroxytryptamine in the longitudinal muscle-myenteric plexus of the ileum was 0.11 μg/g, compared to 6.44 μg/g in the component containing mucosa. The highest value for 5-hydroxytryptamine in the mucosa component was found in the duodenum (30.1 μg/g) and there was a steady decrease through the small and large intestine. When extrinsic nerves to the ileum were damaged, the amount of norepinephrine in the corresponding ileal segment was reduced to less than 5% within 3 days in both fractions of the wall. 6-Hydroxydopamine (35 mg/kg i.v.) reduced to approximately 1/3 the amount of norepinephrine in longitudinal muscle-myenteric plexus of ileum and colon. Reserpine (1 mg/kg s.c. 72 hr earlier) reduced the amount of norepinephrine in longitudinal muscle-myenteric plexus of both ileum and colon to 0.01 μg/g. Doses of reserpine as small as 0.02 mg/kg were still effective in greatly reducing the norepinephrine concentrations. No difference in its effects on ileum and colon was observed.

5820 AGE CHANGES IN α-AMYLASE ACTIVITY IN HUMAN SALIVA. *(Ukr.)* Levyts'kyi, A. P.; Konovets', V. M.; Marchenko, O. I. (Inst. Stomatol., Odessa, USSR). *Fiziol. Zh.* 19(6):819-824, 1973.

5821 A COMPARISON OF THE TRANSPHOSPHORYLATING ACTIVITIES OF HUMAN LIVER AND INTESTINAL ALKALINE PHOSPHATASES. *(E.)* Whitaker, K. B.; Moss, D. W. (Roy. Postgrad. Med. Sch., London, England). *Clin. Chim. Acta* 52(3):347-352, 1974.

5822 THE NEUROENDOCRINE DESIGN OF THE GUT. THE PLAY OF CHEMICALS IN A CHEMICAL PLAYGROUND. *(E.)* Makhlouf, G. M. (Med. Coll. Virginia, Richmond). *Gastroenterology* 67(1):159-184, 1974.

5823 EFFECT OF ISOPROTERENOL ON POLYAMINE METABOLISM IN MOUSE SALIVARY GLANDS. *(E.)* Inoue, H.; Tanioka, H.; Shiba, K.; Asada, A.; Kato, Y.; Takeda, Y. (Dept. Biochem., Osaka Univ., Japan). *J. Biochem. (Tokyo)* 75(4):679-687, 1974.

5824 DEVELOPMENT OF THE RAT SALIVARY GLANDS. III. MESENCHYMAL SPECIFICITY IN THE MORPHOGENESIS OF THE EMBRYONIC SUBMAXILLARY AND SUBLINGUAL GLANDS OF THE RAT. *(E.)* Ball, W. D. (Dept. Zool., Univ. Washington, Seattle). *J. Exp. Zool.* 188(3):277-288, 1974.

5825 PROTEIN PATTERNS IN NORMAL AND INDUCED PATHOLOGICAL SALIVARY GLANDS OF MICE. *(E.)* Feiglin, B.; Reade, P. C. (Dept. Dent. Med., Univ. Melbourne, Parkville, Australia). *Aust. J. Exp. Biol. Med. Sci.* 52(Pt. 1):173-184, 1974.

5826 ON THE ROLE OF THE ADRENERGIC RECEPTORS FOR EXTRANEURONAL AMINE UPTAKE AND RETENTION IN RAT SALIVARY GLANDS IN VITRO. *(E.)* Almgren, O.; Jonason, J. (Dept. Pharmacol., Univ. Goteborg, Sweden). *Naunyn Schmiedebergs Arch. Pharmakol.* 283(1):21-35, 1974.

5827 PEROXIDASE ACTIVITY IN THE DEVELOPING RAT SUBMANDIBULAR GLAND. *(E.)* Yamashina, S.; Barka, T. (Mt. Sinai Sch. Med., New York). *Lab. Invest.* 31(1):82-89, 1974.

5828 FUNCTIONAL SIGNIFICANCE OF NEURONAL AND EXTRANEURONAL TRANSMITTER UPTAKE IN RAT SALIVARY GLANDS. THE EFFECT OF PROTRIPTYLINE AND NORMETANEPHRINE. *(E.)* Almgren, O.; Jonason, J. (Dept. Pharmacol., Univ. Goteborg, Sweden). *Naunyn Schmiedebergs Arch. Pharmakol.* 283(1):1-20, 1974.

See also, 5790, 5822, 5881, 5951.

SECRETION AND METABOLISM

Stomach

5829 EFFECT OF VAGOTOMY ON POSTPRANDIAL GASTRIN LEVELS AND HEIDENHAIN POUCH SECRETION IN THE DOG. *(Ger.)* Becker, H. D.; Reeder, D. D.; Thompson, J. C. (Clin. Polyclin. Gen. Surg., Univ. Gottingen, Germany). *Dtsch. Med. Wochenschr.* 99(19):1023-1024, 1974.

Basal and postprandial serum gastrin levels and Heidenhain pouch acid secretion were measured in 6 dogs with Heinicke-Mikulicz pyloroplasty before and after selective proximal vagotomy, selective gastric vagotomy, and transthoracic truncal vagotomy. Each succeding form of vagotomy was performed at about 5 week intervals on all of the dogs. The mean basal serum gastrin concentration increased from 98 ± 2 pg/ml to 110 ± 5 pg/ml after selective proximal vagotomy and to 129 ± 8 pg/ml after selective gastric vagotomy. No further change occurred after transthoracic truncal vagotomy. All forms of vagotomy, particularly truncal vagotomy, increased postprandial serum gastrin concentrations. The increases in basal and postprandial serum gastrin levels probably result from higher pH in the antrum, but antral dilation resulting from stasis may also be involved. A significant increase (from 3.60 ± 0.50 to 5.38 ± 0.52 mEq/180 min) occurred in postprandial acid output from the denervated Heidenhain pouch after selective proximal vagotomy. Subsequent selective gastric vagotomy produced another increase to 7.15 ± 1.67 mEq/180 min. Transthoracic truncal vagotomy reduces the acid output to 4.97 ± 1.08 mEq/180 min, but this value is still significantly higher than control values. Since the Heidenhain pouch was denervated, these findings can only be accounted for by a humoral factor.

5830 GASTRIN RELEASE BY ETHANOL IN MAN AND IN DOGS. *(E.)* Becker, H. D.; Reeder, D. D.; Thompson, J. C. (Univ. Texas Med. Br., Galveston). *Ann. Surg.* 179(6):906-909, 1974.

Gastrin release by antral mucosa in response to ethanol and the effects of i.v. ethanol on basal serum gastrin concentrations were measured by radioimmunoassay in man and dogs. In 6 healthy young males, ingestion of 50% ethanol in water caused a significant increase from a basal serum gastrin level of 84 ± 5 pg/ml to a peak of 109 ± 4 pg/ml. With 18% ethanol, the peak serum gastrin concentration was significantly higher than basal. Ingestion of 50% ethanol also resulted in an integrated gastrin response, expressed in ng/ml/min, approximately 2.5 times greater than after ingestion of 18% ethanol. In man, a 60-min i.v. infusion of 7% ethanol (4 ml/kg/hr) caused a slight but significant increase of serum gastrin levels to 105 ± 9 pg/ml at 50 min. After infusion was stopped, serum gastrin fell to basal levels. In 5 adult mongrel dogs, perfusion of the antrum with 10% ethanol, pH 5.0, increased the serum gastrin in the antral venous outflow from 107± 6 pg/ml to 338 ± 48 pg/ml. Changing the perfusate to 10% ethanol, pH 1.0, significantly decreased the gastrin concentration (132 ± 20 pg/ml) after 30 min. I.v. infusion of 10% ethanol in dogs (10 ml/kg/hr for 2 hr) increased serum gastrin in antral venous outflow from 105 ± 4 pg/ml to 310 ± 26 pg/ml. Perfusion of the antrum with 0.1 N HCl decreased the antral venous gastrin to 147 ± 4 pg/ml. Thus, the gastrin response to alcohol ingestion is dependent on the mass of alcohol reaching the antrum, and acidification of the alcohol does not abolish its stimulatory effect. In dogs at least, the increase in serum gastrin levels induced by i.v. alcohol is caused by release of antral gastrin.

5831 VARIATION IN THE PATTERN OF CARBONIC ANHYDRASE ACTIVITY IN THE CELLS OF THE GASTRIC GLANDS. *(E.)* Winborn, W. B.; Seelig, Jr. L. L.; Girard, C. M. (Univ. Texas Health Sci. Ctr., San Antonio). *Histochemistry* 39(4):289-300, 1974.

Human gastric mucosa from patients undergoing gastric surgery and hamster gastric mucosa were examined under the electron microscope for carbonic anhydrase after incubation in Hansson's or Hausler's media. Tissues incubated in either media showed lead salt precipitates on the membrane system of the intracellular canaliculus of the parietal cells. However, discrete precipitates were observed within the granular endoplasmic reticulum of the chief cells and on the surface of parietal cell mitochondria only after incubation in Hansson's media. Enzyme activity was increased by betazole and inhibited by acetazolamide. The localization of carbonic anhydrase in the kidney, liver, RBC, and endothelial cells was similar to that observed by previous investigators with Hansson's media. This indicated that the reaction products in the gastric glands were the same as those seen in other tissues. The chief cells might be the main sources of carbonic anhydrase which eventually accumulates on the surface of the mitochondria on the membranes of the intracellular system. Although CO_2 is the product of carbonic anhydrase activity on carbonic acid and is probably formed within the mitochondria of parietal cells, only small amounts of reaction products were evident within the mitochondria. Thus, localization of the enzyme on the surface of the mitochondria may reflect the inability of the incubating media to penetrate the mitochondrial membranes. It is also possible that lead precipitates observed in the interior of chief and parietal cells are artifacts.

5832 EFFECT OF PENTAGASTRIN AND CARBACHOL ON ACID SECRETION IN THE SHAY RAT (PYLORUS-LIGATED RAT). *(Fr.)* Vagne, M.; Fargier, M. C.; Desvigne, A.; Chayvialle, J. A.; Lambert, R. (Edouard Herriot Hosp., Lyon, France). *Therapie* 28 (4):683-687, 1973.

Shay's technique was used to determine gastric response to pentagastrin (5-160 μg/kg s.c.) and carbachol (10-600 μg/kg s.c.) in female Sprague-Dawley rats. Controls received injections of physiological saline. Measurements were made 3 hr post-injection. With 80 μg/kg pentagastrin, the volume and acid output increased to 114% and 155%, resp., of control values. With 50 μg/kg carbachol, the volume was increased to 157%, the acid output to 164%, and the acid concentration to 126% [sic!] of control values. Supramaximal doses of carbachol (800 μg/kg) severely inhibited acid output so that it was essentially the same as in controls. It is stated that the increases found with pentagastrin were small and that those with carbachol showed clear augmentation.

5833 GASTRIC ACID SECRETION AND ULCEROGENESIS IN HISTAMINE-TREATED GUINEA PIGS. *(E.)* Hohnke, L. A. (Med. Res. Lab., Pfizer Inc., Groton, Conn.). *Gastroenterology* 66(6):1161-1167, 1974.

Gastric erosions were produced in guinea pigs by a single i.p. injection of histamine acid phosphate (5 mg/kg) and duodenal erosions by multiple i.m. injections (0.55 mg/kg every 30 min for 3-4 hr). Unlike gastric lesions, duodenal lesions were associated with a significant gastric output. The duodenal ulcer index and total acid output were proportional to the histamine dose; both parameters increased through 6 injections and subsequent injections had little additional effect. Ligating the pylorus eliminated formation of duodenal lesions indicating that contact of gastric juice with duodenal mucosa is a requirement for damage to the duodenum. Mepyramine and pyribenzamine (each 2 x 10 mg/kg i.p.) protected completely against gastric erosions, but this protective effect was accompanied by extensive duodenal damage. Buramimide (2 x 10 mg/kg) protected against duodenal lesions (56%) when injected intracardially but not i.p. Atropine (0.1 mg/kg i.p.) and carbenoxalone (100 mg/kg i.p.) protected 56% and 90% resp., against duodenal lesions. Neither atropine nor carbenoxalone caused any significant reduction in gastric acid output, suggesting that their protective effects are independent of their effect on gastric acid output, or that gastric acid is not primarily responsible for histamine-induced duodenal erosions in the guinea pig. Since carbenoxalone stimulates mucus output in man and rats, an enhanced mucus output in the duodenum may explain its protective effect against duodenal ulceration in guinea pigs. Lack of protection against gastric ulceration implies that the distribution of mucus-producing cells in the guinea pig differs from that in man and rat.

5834 THE EFFECT OF EXOGENOUS SECRETIN AND CHOLECYSTOKININ (CCK) ON PENTAGASTRIN-STIMULATED INTRINSIC FACTOR (IF) SECRETION IN MAN. *(E.)* Vatn, M. H.; Berstad, A.; Myren, J. (Ulleval Univ. Hosp., Oslo, Norway). *Scand J. Gastroenterol.* 9(3):313-317, 1974.

The secretion of gastric intrinsic factor was examined in 6 healthy subjects during i.v. infusion of pentagastrin (1 μg/kg/hr) alone or in combination with secretin (2 U/kg/hr) or 20% cholecystokinin (2 U/kg/hr). Cholecystokinin caused a reduction of intrinsic factor, acid, and pepsin output, but the last was not statistically significant. Secretin caused a significant reduction of acid and augmentation of pepsin output, whereas the output of intrinsic factor was unchanged. The findings suggest that secretin has a different effect on the secretion of the 3 components of gastric juice: intrinsic factor, acid, and pepsin.

5835 PREVENTIVE EFFECT OF FUSARIC ACID, A DOPAMINE β-HYDROXYLASE INHIBITOR, ON THE GASTRIC ULCERATION INDUCED BY WATER-IMMERSION STRESS IN RATS. *(E.)* Osumi, Y.; Takaori, S.; Fujiwara, M. (Fac. Med., Kyoto Univ., Japan). *Jap. J. Pharmacol.* 23(6):904-906, 1973.

The effect of fusaric acid (5-butylpicolinic acid) on gastric ulceration induced by immersing Wistar rats in water was studied with speical reference to brain norepinephrine and dopamine. Pretreatment of rats with 100 mg/kg fusaric acid i.p. 1.5 hr prior to immersion for 3 hr almost completely prevented the formation of gastric ulcer; the ulcer index was only 0.5 ± 0.3. The brain norepinephrine content in these animals did not differ significantly from that of nonstressed rats treated with the same dose of fusaric acid 4.5 hr before sacrifice. Intraventricular administration of fusaric acid (0.5 mg/animal) also prevented gastric ulceration: the ulcer index for these rats was 1.7 ± 0.4 compared with 3.6 ± 0.3 for controls. In contrast, tetrabenazine (50 mg/kg i.p., 30 min prior to stress) aggravated the gastric ulcer (ulcer index 4.4 ± 0.4). Brain norepinephrine and dopamine levels in these rats decreased to 9 and 4% of the control, resp., with increased release of these catecholamines. The results suggest that prevention of gastric stress ulcer by fusaric acid is due to decreased release of norepinephrine in the central nervous system.

5836 PURE HUMAN BIG GASTRIN. IMMUNOCHEMICAL PROPERTIES, DISAPPEARANCE HALF TIME, AND ACID-STIMULATING ACTION IN DOGS. *(E.)* Walsh, J. H.; Debas, H. T.; Grossman, M. I. (VA Wadsworth Hosp. Ctr., Los Angeles, Calif.). *J. Clin. Invest.* 54(2): 477-485, 1974.

Biological properties of pure natural human big gastrin (containing 34 amino acid residues) were compared with those of pure natural heptadecapeptide gastrins (with 17) from human and porcine sources. Radioimmunoassay inhibition curves indicated that natural gastrin was nearly 1.5 times more potent than big gastrin with the antibody used in this study. This difference was confirmed by demonstration of increased immunoreactivity generated when big gastrin was converted to natural gastrin by trypsinization. When infused i.v. into 4 dogs with gastric fistulas and Heidenhain pouches in equimolar doses, big gastrin produced slightly higher acid secretory responses. Responses to sulfated and nonsulfated forms were not significantly different, nor were responses to human and porcine natural gastrin. During infusion of equimolar doses, steady-state serum gastrin concentrations were more than 5-fold higher with big gastrin than with natural gastrin. The difference in steady-state blood concentrations could be accounted for by a corresponding difference in removal rates. The half times of the big gastrin preparations averaged 15.8 min while the half times of the natural gastrin preparations averaged 3.2 min. The calculated spaces of distribution for the 2 compounds were similar, about 25% of body weight. When the increment in serum gastrin was plotted against acid secretory response, it was found that nearly 5 times greater increments in molar concentrations of big gastrin than of natural gastrin were required to produce the same rate of acid secretion. The potency of these two molecular forms of gastrin can be expressed in two different ways. Based on exogenous molar doses, the potencies of the 2 gastrins were similar. However, based on molar increments in serum gastrin concentration, natural gastrin was approximately 5 times more potent than big gastrin. Hence, fractionation of these gastrin components may be important in estimating the acid-stimulating action represented by total serum gastrin as measured by radioimmunoassay.

5837 ACID RESPONSE TO GRADED DOSES OF PENTAGASTRIN AND FEEDING, AND EFFECT OF ATROPINE IN HEIDENHAIN POUCH CATS. *(E.)* Svensson, S.-O.; Emas, S. (Dept. Surg., Univ. Lund, Malmo, Sweden). *Scand. J. Gastroenterol.* 9(3):281-286, 1974.

In cats with both gastric fistulas and Heidenhain pouches, the maximum of the dose-response curve for Heidenhain pouch acid output (gastric fistula closed) to graded doses of i.v. pentagastrin was higher than that to graded meat meals. The maximal response to feeding was 70% of that to pentagastrin. Administration of atropine (0.1 mg/kg, i.v.) prior to stimulation with pentagastrin or meat markedly reduced the maximal response to feeding but did not alter the same level of response to pentagastrin. This could mean that endogenous gastrin was more susceptible than pentagastrin to inhibition by atropine at the parietal cells, or that atropine inhibited the release of gastrin, or both. The Heidenhain pouch acid response to 2-deoxy-D-glucose (100 mg/kg, i.v. gastric fistula open) amounted to 1/5-1/6 of the maximal response to feeding (gastric fistula closed), suggesting that feeding released more gastrin than vagal stimulation with 2-deoxy-D-glucose alone. Since treatment of peptic ulcer patients with optimal doses of 1-hyoscyamine had previously been shown to reduce the peak acid response to pentagastrin by about 30%, it is suggested that, on the basis of results of the present study, treatment of patients with anticholinergic drugs might more effectively reduce acid secretion in response to a meal than to pentagastrin.

5838 THE EFFECT ON THE STOMACH TISSUE OF REGIONAL STOMACH PERFUSION WITH DAUNOMYCIN. *(E.)* Fischerman, K.; Olsen, J. (Rigshosp., Copenhagen, Denmark). *Acta. Chir. Scand.* 140(2):143-146, 1974.

Healing of a gastroenteroanastomosis in pigs, performed after extracorporeal gastric perfusion with daunomycin, has been investigated, along with the effect on the tissue of retention of the drug in the stomach. The *in vivo* perfusion with daunomycin (2 mg/kg) was carried out on 8 animals for a period of 30 min. The outflow was allowed to proceed unimpeded in 4 of the animals, while in 2 it was arbitrarily occluded for 3 min and in the remaining 2, for 5 min. In one control animal, perfused without daunomycin, the outflow was occluded for 5 min. The perfused areas were then stained blue by addition of T 1824 to the perfusate. Finally, gastroenteroanastomosis was carried out on each animal. No macroscopic changes in the mucosa were seen when the outflow of the drug perfusate was unimpeded. Small ulcerations appeared in the mucosa of animals in which the outflow was occluded for 3 min; large ulcerations, when the outflow was occluded for 5 min. No perforation of the stomach wall was seen, however, and all gastroenteroanastomoses were healed in 14 days after the operation. No changes in the gastric mucosa appeared in the control animal. These results indicate that temporary occlusion of the outflow during stomach perfusion can be used in the treatment of inoperable cases of carcinoma of the stomach with the object of necrotizing large tumor areas. This technique may also be used as an initial treatment with cancer chemotherapeutic agents in connection with palliative stomach resection, without the risk of incomplete healing of gastroenteroanastomoses in the perfused areas.

5839 INDUCTION OF AUTOALLERGIC GASTRITIS IN DOGS. *(E.)* Porteous, J. R.; Fisher, J. M.; Lewin, K. J.; Taylor, K. B. (Stanford Univ. Med. Ctr., Calif.). *J. Pathol.* 112(3):139-146, 1974.

An attempt was made to develop a functional experimental model of autoallergic gastritis. Test dogs were injected (intradermally, s.c., or i.m.) with either a homologous preparation of gastric juice or gastric mucosa, emulsified with Freund's adjuvent. Of the 4 dogs receiving the gastric mucosal antigen, 2 demonstrated a significant decrease in acid output from Heidenhain pouches following maximal stimulation with histamine. Sera from one of the dogs formed precipitin lines against the antigen on immunodiffusion. Neither of these features was demonstrated by the control dogs or those immunized with gastric juice preparation. Neither were antibodies found in sera tested by immunofluorescence and complement fixation. There was no significant histologic difference between control and test dogs, and the histologic findings did not correlate with the functional studies. These findings indicate the need to establish a representative histologic base line prior to any attempts at production of autoallergic gastritis. It is suggested that parenteral immunization with a gastric mucosal homogenate produces decreased acid output probably *via* an immunological mechanism.

5840 INHIBITION OF PENTAGASTRIN-INDUCED GASTRIC ACID SECRETION IN MAN BY INTRAJEJUNAL GLUCOSE ADMINISTRATION. *(E.)* Christiansen, J.; Hendel, L. (Glostrup Hosp., Copenhagen, Denmark). *Acta Chir. Scand.* 140(3):246-248, 1974.

The effect on gastric acid secretion of intrajejunal instillation of hyperosmolar glucose was studied in 5 healthy male subjects. After a 90 min stimulation with a submaximal dose of pentagastrin (0.5 ug/kg/hr), 100 ml of 50% glucose was administered through a jejunal tube over a 5 min period. In all subjects, steady-state secretion was obtained after 45 min of pentagastrin stimulation. A new and lower secretory plateau was reached after intrajejunal instillation of glucose. Mean acid output during steady-state secretion was reduced 71%, from 8.5 to 2.2 mEq/15 min. Intrajejunal administration of hyperosmolar glucose markedly depressed the secretory volume as well as the acidity on the average of 66% and 68%, resp. Thus, intrajejunal instillation of hyperosmolar glucose inhibited gastric acid secretion significantly. The reduction in secretory volume proves this inhibition cannot be ascribed to reflux from the duodenum. Whether the acid-inhibitory action of glucose instillation is mediated by release of gut-glucagon or by some other intestinal hormone or combination of hormones is not certain. This study has demonstrated a jejunal acid inhibitory mechanism of probably the same magnitude as the duodenal inhibitory mechanism. The findings emphasize the role of gastric acid hypersecretion as a cause of peptic ulcer and malabsorption in patients who have undergone massive small bowel resection or bypass.

5841 INFLUENCE OF PARATHYROID HORMONE AND VITAMIN D ON BASAL GASTRIC SECRETION IN RATS. *(E.)* Ohrn, P. G.; Frenning, B.; Hessman, Y.; Johansson, H.; Segerstrom, A. (Univ. Hosp., Uppsala, Sweden). *Scand. J. Gastroenterol.* 9(3):275-279, 1974.

The effect of parathyroid hormone on basal gastric secretion of hydrochloric acid and mucus was compared with that of vitamin D during a 14-day period of treatment on 10 male Sprague-Dawley rates prepared with chronic gastric fistulae. Parathyroid hormone (40 U/100 g s.c.) induced an increase in serum calcium level after 1 week and a further increase after 2 weeks. No change in serum calcium was observed after 1 week of vitamin D treatment (36,000 IU/100 g s.c.) but the levels were increased after a further 7 days. After 14 days the parathyroid hormone and vitamin D treatments induced similar decreases in gastric secretory rate. However, the acidity diminished to a greater degree in vitamin D-treated rats, possibly because the serum calcium level became more elevated in vitamin D-treated rats after 14 days. This result may indicate that acidity is more dependent on the serum calcium level than is the gastric secretory rate. The hydrogen ion concentration in gastric juice from parathyroid hormone-treated rats did not differ from pretreatment values, but was slightly lower than recorded in the control group receiving saline. Chloride ion concentration and fucose concentration were independent of parathyroid hormone or vitamin D or saline. Mean concentration of total sialic acid in parathyroid hormone-treated rats did not differ from pretreatment levels, but consecutive reductions were found in saline-treated controls. After 1 week of vitamin D treatment, a minor increase was noted in the total sialic acid concentration. The relation between free and total sialic acid did not change during treatments. These results appear to exclude an increased concentration of hydrogen ions in the gastric juice as a cause of gastric ulcers in hyperparathyroid rats.

5842 Penicillium viridicatum MYCOTOXICOSIS IN THE RAT. III. HEPATIC AND GASTRIC LESIONS. *(E.)* McCracken, M. D.; Carlton, W. W.; Tuite, J. (Sch. Vet. Sci. Med., Purdue Univ., West Lafayette, Ind.). *Food Cosmet. Toxicol.* 12(1):99-105, 1974.

Hepatic and gastric lesions developed in male rats fed grain cultures and fungal mats of *Penicillium viridicatum.* In the present experiment, the progression of hepatic changes was followed in rats fed a rice culture of the fungus at a dietary concentration of 25%. Initial lesions consisted of edema of the portal areas and pericholangitis, and were followed by hypertrophy and hyperplasia of the biliary epithelium, periductal fibrosis, and focal areas of hepatic cell necrosis. Later lesions were necrotizing cholangitis, stenosis, and obliteration of biliary ducts. A severe necrotizing cholangiohepatitis developed in rats fed fungal mats of *P. viridicatum.* Gastric erosions occurred in the fundic mucosa, and some rats developed a necrotizing cellulitis of the gastric submucosa apparently unrelated to the erosions. The toxin(s) elaborated by this isolate of *P. viridicatum* induced a unique spectrum of lesions, and it is proposed that the pathological alterations were the result of blood-borne toxin(s). In addition to producing ocular and hepatic lesions, the toxic principle in grain cultures and fungal mats appeared to have a predilection for the vessels in the loose connective tissue in several locations, such as the scrotum, gastric submucosa, and body subcutis.

5843 HIGH ENERGY PHOSPHATE COMPOUNDS OF GASTRIC TISSUE IN RATS. *(E.)* Kowalewski, K. (Surg. Med. Res. Inst., Univ. Alberta, Edmonton, Canada). *Arch. Int. Physiol. Biochim.* 82(1):1-6, 1974.

The content of ATP, ADP, and AMP in the resting and secreting mammalian stomach *in vivo* was studied in gastric fistula of male Wistar rats. The rats were divided into 4 groups. Group 1 was infused *via* the vena cava with normal saline; group 2 was similarly infused with histamine in saline; group 3 was fasted for 24 hr with no infusion; and group 4 was fasted 24 hr with no infusion, then fed 30 g corned beef/kg body weight. Compared with saline infused controls, animals stimulated with histamine had a significant increase in HCl and pepsin outputs. After 24 hr of saline or histamine infusion, the rats were sacrificed, their stomachs were separated into the glandular part and rumen, and the different types of tissues were analyzed for ATP, ADP, and AMP. Similar tests were carried out on stomachs of animals not infused. The ranges of values within each group in the study showed very great variation from one stomach to another. No significant correlation was found between the fasting, postprandial, or posthistamine state of the stomach and the concentrations of high-energy phosphates in gastric tissues. The study thus failed to demonstrate that high energy phosphates, and particularly ATP, are a possible source of energy necessary for the production of H^{+}.

5844 EFFECT OF DRUGS ON STRESS ULCER AND SECRETION IN STOMACH. *(Jap.)* Nakane, S.; Sakai, T. (Taisho Pharm. Co., Ltd., Tokyo, Japan). *Folia. Pharmacol. Jap.* 70(1):1-7, 1974.

5845 PROGRESS REPORT. INHIBITION OF GASTRIC SECRETION BY THE PYLORIC ANTRUM. *(E.)* Wheeler, M. H. (Univ. Hosp. Wales, Cardiff). *Gut* 15 (5):420-432, 1974.

5846 PEPSIN IN GASTRIC JUICE IN CHILDREN. *(Rus.)* Alimova, M. M.; Sheliapina, V. V. (Inst. Pediatr., Moscow, USSR). *Vopr. Pitan.* (3):47-49, 1974.

See also, 5799, 5816, 5849, 5858, 5859, 5964, 6103, 6107.

SECRETION AND METABOLISM

Pancreas

5847 EFFECT OF HEPARIN ON PANCREATIC FUNCTION IN THE DOG. *(Ger.)* von Nowak, W.; Sill, U.; Lippert, H.; Hommel, H.; Fischer, U. (Surg. Clin. Polyclin., Ernst Moritz Arndt Univ., Greifswald, Germany). *Z. Gesamte Inn. Med.* 29(6):250-252, 1974.

In vivo experiments were performed on dogs to determine whether increases in pancreatic or biliary secretion are responsible for increases in the volume of duodenal contents and their bicarbonate concentrations found after injection of heparin. Both under basal conditions and during infusion of secretin (0.25 U/kg/min), heparin (200 IU/kg i.v.) first increased and then decreased pancreatic secretion, but these changes were not significant. Between 15 and 30 min after heparin injection significant increases did occur in the volume of the duodenal contents and its bilirubin concentration. It is concluded that heparin causes an increase in the volume of the duodenal contents by increasing bile flow rather than exocrine pancreatic secretion. Administration of 100 IU/kg heparin i.v. inhibited both basal and glucose-induced insulin secretion in dogs.

5848 EFFECTS OF INTRAGASTRIC AND INTRADUODENAL ETHANOL ON CANINE EXOCRINE PANCREATIC SECRETION. *(E.)* Tiscornia, O. M.; Gullo, L.; Sarles, H.; Mott, C. B.; Brasca, A.; Devau, M. A.; Palasciano, G.; Hage, G. (Res. Unit Dig. Dis., INSERM, Marseille, France). *Digestion* 10(1):52-60, 1974.

The effects of intragastric or intraduodenal instillation of ethanol on exocrine pancreatic secretion were assessed in 9 mongrel dogs provided with pancreatic and gastric fistulae (Thomas cannula) and submitted to a continous i.v. injection of secretin (1.0 U/kg hr). The experiments were carried out on the same group of dogs either in the conscious state or under very light halothane anesthesia. Intragastric instillation of ethanol (1.0 g/kg) in anesthetized dogs resulted in significant increases in: bicarbonate output and flow rate comparable to 1/4 of the effect produced by secretin administration; and in protein concentration and output similar to 1/3 of the effect due to secretin with added cholecystokinin injection. Intraduodenal ethanol (0.7 g/kg) changed protein concentration significantly in anesthetized dogs but did not induce any significant modification in conscious animals. Intraduodenal HCl (2.5 mM) at the end of the ethanol infusion revealed that the intestinal mucosa was still able to release secretin and cholecystokinin. It is concluded that p.o. ethanol stimulates pancreatic secretion only when the stomach is present and able to secrete HCl and when it can evacuate its contents into the duodenum. In humans, there is a moderate but significant increase in bicarbonate output after intraduodenal ethanol infusion. This effect did not occur in the dogs.

5849 GASTRIC ACID DOES DRIVE PANCREATIC BICARBONATE SECRETION. *(E.)* Grossman, M. I.; Konturek, S. J. (VA Wadsworth Hosp. Ctr., Los Angeles, Calif.). *Scand. J. Gastroenterol.* 9(3):299-302, 1974.

Earlier studies questioned whether the amount of acid in the duodenum after meals was great enough to stimulate pancreatic secretion. In this study, in dogs with gastric and pancreatic fistulas, a meal of liver was instilled into the gastric fistula, and the pH of the gastric contents was held constant at various levels by continuous intragastric titration. With intragastric pH held at 7.0, pancreatic bicarbonate secretion was low and protein secretion moderate,characteristic of the response to cholecystokinin alone. No augmentation of pancreatic bicarbonate secretion occurred as intragastric pH was lowered from 7.0 to 4.5. Between pH 4.5 and 3.0 bicarbonate secretion rose sharply in response to increasing acidification. Bicarbonate secretion was already near maximal at pH 3.0 and so showed little further increase as pH was lowered to 1.5. Augmentation of pancreatic protein secretion occurred in the same range of pH that caused bicarbonate responses. With a meal held at pH 5.0 by intragastric titration, about 0.4 U/kg/hr of exogenous secretin produced bicarbonate and protein responses equal to those of a natural meal. It is concluded that gastric acid plays a major role in driving pancreatic secretion. The small amount of secretin released is highly effective because of the amplifying effect of cholecystokinin released by other constituents of the meal.

5850 EFFECT OF CARBACHOL ON AMINO ACID INCORPORATION INTO PROTEIN OF RAT PANCREAS In Vitro.

(E.) Irwin, C.; Tenenhouse, A. (Dept. Pharmacol. Therap., McGill Univ., Montreal, Canada). *Can. J. Physiol. Pharmacol.* 52(3):632-640, 1974.

The effect of various cholinergic drugs on incorporation of ^{3}H-leucine into protein of rat pancreas *in vitro* was studied. Carbachol (10^{-5} M) and bethanechol (10^{-4} M), but not pilocarpine, inhibited incorporation 70-80%. Even in the continued presence of carbachol, the rate of incorporation is depressed only 40-60 min. It recovers and eventually exceeds that seen in untreated tissue. After 4 hr incubation the amount of ^{3}H-leucine incorporated into protein is the same in carbachol-treated and untreated tissue. The alteration of amino acid incorporation can be dissociated from the effect of the drug on secretion in several ways: (1) calcium deprivation abolishes carbachol-stimulated secretion but not the inhibition of amino acid incorporation; (2) atropine, 10^{-8} M, totally abolishes the effect of carbachol on amino acid incorporation without affecting secretion (10^{-5} M atropine is needed to abolish carbachol stimulated secretion); (3) pilocarpine stimulates secretion but has no effect on amino acid incorporation. The inhibition of amino acid incorporation is not due to inhibition of amino acid transport nor to a decrease in tissue ATP concentration. It is concluded that there is no clear relation between protein secretion and synthesis. Muscarinic agents, which stimulate secretion of protein, may also cause changes in the rate of amino acid incorporation into protein; however, the changes observed will depend on when, after administration of the secretagogue, protein synthesis is measured.

5851 HISTOLOGICAL FINDINGS AND AMYLASE CONTENTS OF THE PANCREAS AND PAROTID GLAND OF RATS WITH EXPERIMENTAL OBSTRUCTION OF THE COMMON BILE DUCT.

(E.) Kakizaki, G.; Saito, T.; Soeno, T.; Fujiwara, Y.; Ohizumi, T.; Sasahara, M.; Yamazaki, M.; Nihei, T.; Ishidate, T.; Senoo, A. (Akita Univ. Sch. Med., Japan). *Tohoku J. Exp. Med.* 112(1):79-88, 1974.

In 9 Wistar rats the common bile duct was ligated at the hepatic hilus (superior to the site of inflow of the pancreatic duct). After 96 hr histological changes in the pancreas and parotid were studied and compared with findings for 10 control rats. Amylase activity was measured in both organs and in serum. In animals with common bile duct obstruction, the pancreas contained somewhat fewer zymogen granules and fine granular fat droplets in the glandular acinar cells. Round cell infiltration was noted occasionally in the coarse connective tissue outside the pancreatic parenchyma. Histologically, the parotid in rats with biliary obstruction was similar to the normal gland; the only abnormality was fat droplets in the glandular acinus. Pancreatic amylase activity was decreased after common bile duct obstruction, but parotid amylase was normal. Serum amylase was decreased in the obstruction group. These results indicate that common bile duct obstruction does not significantly affect the histology and function of the parotid gland.

5852 INFLUENCE OF BILE DUCT LIGATION ON EXOCRINE PANCREATIC SECRETORY ACTIVITY IN THE RAT.

(E.) Geratz, J. D.; Lamb, J. C. IV (Univ. North Carolina Sch. Med., Chapel Hill). *Am. J. Physiol.* 227(1):119-122, 1974.

Ligation of the proximal common bile duct in the anesthetized rat led to a marked decrease in spontaneous and trypsin inhibitor-induced secretion of pancreatic amylase as judged by the amount of enzyme in the small intestine. The reduction in output was not influenced by feeding rat bile or sodium taurocholate solution, showing that the reduced enzyme output in ligated animals is not due to absence of bile acids or other bile constituents from the intestine. To determine whether increased intrabiliary pressure caused by the bile duct occlusion was indirectly responsible for the altered pancreatic response, rats were furnished with a cannula proximal to the ligature and draining to the outside. This procedure led to a rise in spontaneous amylase secretion and an additional stimulation of enzyme release when trypsin inhibitor was administered. These differences were not large, however, and were not significant at the 5% level. When biliary-pancreatic secretions were collected from a distal bile duct fistula, the amylase output showed a 1.5-fold increase over a 3 hr period. In rats where such a fistula was combined with a proximal bile duct ligature, there was a 50% fall rather than a rise in amylase secretion.collected from the distal bile duct fistula. Presence of a fistula proximal to the ligature or of a bypass around the ligature prevented the decline in enzyme levels in this fistula, but did not produce the hypersecretory state seen in the ligature-free rats. Perfusion of bile or Ringer solution through the duct distal to the ligature did not significantly raise the depressed secretion values. The results thus showed that the release of enzyme by the rat pancreas was affected by the location of a bile duct ligature. None of several possible explanations for the phenomenon was substantiated.

5853 ZINC DEFICIENCY AND DECREASED PANCREATIC SECRETORY RESPONSE.

(E.) Sullivan, J. F.; Burch, R. E.; Quigley, H. J.; Magee, D. F. (VA Hosp., Omaha, Neb.) *Am. J. Physiol.* 227(1):105-108, 1974.

Since low serum zinc concentrations and pancreatic abnormalities are common in cirrhosis, a study was carried out to evaluate the effect of dietary zinc deficiency on pancreatic secretory mechanisms. Pancreatic juice was obtained by cannulating the pancreatic ducts of 10 pigs fed a zinc-deficient diet for 6 weeks. Five of the animals received zinc supplementation (120 μg/g diet) throughout the study and served as controls. I.v. infusion of secretin (0.25 U/min in 2 ml physiological saline) caused a decrease in the volume of pancreatic juice secreted by zinc-deficient pigs. This pancreatic juice contained reduced concentrations of magnesium and calcium and decreased protease and amylase activity. Zinc was not detectable in pancreatic juice following secretin stimulation in either control or zinc-deficient pigs. When vagal stimulation, i.v. cerulein injection, or gastric infusion were each combined with a secretin infusion, increases in zinc, calcium, magnesium, protease, and amylase resulted, but the increases were smaller in the zinc-deficient animals than in the controls. Histologically, the acinar tissue from zinc-deficient pig pancreas revealed decreased granularity and decreased cytoplasm. Histochemical staining revealed no appreciable difference in pancreatic malic dehydrogenase, lactic dehydrogenase, NADH diaphorase, alkaline phosphatase, or alcohol dehydrogenase (all of which are zinc metalloenzymes) in control and zinc-deficient pigs. Trace metal analysis of pancreatic tissue revealed significantly decreased zinc levels associated with zinc deficiency, but the calcium and magnesium contents were not significantly different from control values. The mechanism by which zinc deficiency diminishes pancreatic secretory response to known secretagogues is unexplained.

5854 METHADONE-INDUCED INHIBITION OF CENTRAL VAGAL PANCREATIC STIMULATION PRODUCED BY 2-DEOXY-D-GLUCOSE. *(Fr.)* Vaille, C.; Roze, C.; de La Tour, J.; Souchard, M; Debray, C. (Bichat Hosp., Paris, France). *C. R. Acad. Sci.* [*D*] *(Paris)* 278:2839-2841, 1974.

Pancreatic secretion was investigated in 2 groups of anesthetized male Wistar CF rats with pancreatic and biliary fistulas before and after injection with (1) large doses of 2-deoxy-D-glucose (25 mg i.v.) or (2) methadone (5 mg/kg s.c.) followed, 5 min later, by 2-deoxy-D-glucose (25 mg i.v.). The effect of 2-deoxy-D-glucose on pancreatic secretion reached a maximum 1-1.5 hr after injection when the output of water was increased by about 2.5 fold, the amylase concentration 3-fold, and the total protein concentration 3.5-fold. The outputs of amylase and total protein were increased 8- to 10-fold. When methadone was administered first, pancreatic stimulation induced by 2-deoxy-D-glucose was completly blocked but basal pancreatic secretion remained unchanged, as was verified in rats given methadone alone. The blocking effect of methadone on vagal pancreatic stimulation induced by 2-deoxy-D-glucose is similar to the effect of desipramine on gastric secretion stimulated by 2-deoxy-D-glucose in the dog and the effects of desipramine and morphine on gastric secretion in pylorus-ligated rats. Since these compounds are much more active when injected i.v., they probably act on the central nervous system. The effect of methadone is not due to peripheral blocking of cholinergic receptors, because preliminary experiments indicate that the effect of exogenous acetylcholine on pancreatic secretion is unaffected by methadone.

5855 STIMULATION OF DNA SYNTHESIS IN MOUSE PANCREAS BY TRIIODOTHYRONINE AND GLUCAGON. *(E.)* Malamud, D.; Perrin, L. (Massachusetts Gen. Hosp., Boston). *Endocrinology* 94(4):1157-1161, 1974.

A single s.c. or i.p. injection of triiodothyronine (20 μg) and glucagon (200 μg) stimulated growth of liver, kidney, and pancreatic tissue in Charles River mice. The greatest stimulation of cell proliferation, as evaluated by DNA specific activity, occurred in the pancreas. When the hormones were given s.c., there was also marked stimulation of DNA synthesis in the liver. Pancreatic hyperplasia was confined to the cells of the exocrine pancreas. In liver, both hepatocytes and Kupffer cells demonstrated increased labeling with ^{3}H-thymidine. Cellular hypertrophy, as measured by the ratio of RNA to DNA, was increased in liver and kidney. Triiodothyronine and glucagon produced about equal and additive increases in ^{3}H-thymidine incorporation into pancreatic DNA. The present system should be useful for studying factors controlling pancreatic growth.

5856 ENZYME FUNCTION OF THE PANCREAS WHEN ANABOLIC AGENTS AND DIETS CONTAINING DIFFERENT AMOUNTS OF PROTEIN ARE ADMINISTERED. *(Rus.)* Narodetskaia, R. V.; Nesterin, M. F.; Solov'eva, G. I. (Inst. Nutr., Moscow, USSR). *Vopr. Pitan.* (3):37-41, 1974.

5857 GENERAL AND METABOLIC SEQUELAE OF CONSERVATIVE OPERATIONS. *(Fr.)* Govaerts, J. P. (Brugmann Hosp., Brussels, Belgium). *Ann. Gastroenterol. Hepatol. (Paris)* 9(5):501-508, 1973.

5858 COMPARISON OF EFFECTS OF METAMIDE, A HISTAMINE H_2-RECEPTOR ANTAGONIST AND ATROPINE ON GASTRIC AND PANCREATIC SECRETION. *(E.)* Konturek, S. J. (Med. Acad., Krakow, Poland). *Acta Hepatogastroenterol.* 21:81, 1974.

5859 THE EFFECT OF GASTRIC HYPERSECRETION ON THE RELEASE OF ENDOGENOUS SECRETIN FROM THE DUODENUM IN THE DOG. *(E.)* Gammeltoft, M.; Henriksen, F. W.; Rune, S. J. (Inst. Exp. Res. Surg., Univ. Copenhagen, Denmark). *Acta Hepatogastroenterol.* 21:83, 1974.

5860 THE EFFECT OF DODECYLBENZENE SULFONATE-CONTAINING DISH WASHING LIQUIDS ON THE EXOCRINE FUNCTION OF THE RAT PANCREAS. *(Hun.)* Agnes, J. N. Z. (Natl. Inst. Nutritional Sci., Budapest, Hungary). *Egeszsegtudomany* 18(1):9-16, 1974.

5861 INHIBITION OF PANCREATIC AMYLASE SECRETION IN VITRO BY TETRACAINE: POSSIBLE MODE OF ACTION.

(E.) Beaudoin, A. R.; Dunnigan, J.; Morisset, J. (Gastrointestinal Res. Unit, Sherbrooke Univ., Canada). *Gastroenterology* 66(4):663, 1974.

SECRETION AND METABOLISM

Hepatobiliary Tract

5862 RAPID TRANSFER OF FOLIC ACID FROM BLOOD TO BILE IN MAN, AND ITS CONVERSION INTO FOLATE COENZYMES AND INTO A PTEROYLGUTAMATE WITH LITTLE BIOLOGICAL ACTIVITY.

(E.) Lavoie, A.; Cooper, B. A. (Royal Victoria Hosp., Montreal, Quebec Canada). *Clin. Sci. Mol. Med.* 46(6): 729-741, 1974.

^{3}H- folic acid infused i.v. into 9 patients (42 to 72 yr) with bilary fistulae appeared promptly in the bile, coincident with ^{131}I-labeled Rose Bengal injected simultaneously. The radioactivity was distributed among several fractions of biological folates present in bile in association with folic acid and with an unidentified folate which chromatographed on DEAE-Sephadex close to 10-formyltetrahydrofolyl monoglutamate. Based on the affinity for DEAE-Sephadex and the support of growth of *Lactobacillus casei, Streptococcus fecalis* and *Pediococcus cerevisiae*, some folates of human bile were identified as 10-formyltetrahydrofolate, 10-formylfolate, 5-formyltetrahydrofolate, 5-methyltetrahydrofolate and tetrahydrofolate or 5,10-methylene tetrahydrofolate. After infusion of folic acid, the formyltetrahydrofolates increased more rapidly than did the 5-methyltetrahydrofolate. The unidentified radioactive folate contained both the pteridine and *p*-aminobenzoate portions of folate. It did not appear to support growth of the test microorganisms and did not seem to be bound to a protein or a chain of γ-glutamates. This unidentified radioactive folate was present in the bile of a dog injected with ^{3}H-folic acid but was absent from extracts of liver; it may be a transport form of folate or a special modification imposed on folic acid during transport across the liver. When folic acid was presented to the liver after i.v. infusion in doses similar to the folate content of a high folate meal, some was rapidly cleared across the liver into the bile at a rate similar to the clearance of Rose Bengal. Apparently biologically active folate was flushed from the hepatic cells into the bile. The small recovery of radioactive folate coenzymes during the period of collection indicates that most of the folic acid presented to the liver entered the intracellular folate pools and was diluted by endogenous nonradioactive folate.

5863 ENERGY REQUIREMENT IN REGENERATIVE AND ATROPHIC PROCESSES OF THE LIVER IN MAN AND OTHER MAMMALS.

(E.) Yamaoka, Y.; Ohsawa, T.; Takasan, H.; Ozawa, K.; Honjo, I. (Kyoto Univ. Fac. Med., Japan). *Surg. Gynecol. Obstet.* 139(2): 234-240, 1974.

Mitochondrial metabolism in liver regeneration and atrophy processes was studied in adult male Wistar rats, mongrel dogs of both sexes, *Macaca irus* monkeys, and humans. Liver specimens were obtained from patients at laparotomy for stomach cancer and hepatic carcinoma localized in another lobe. In animals, fluctuations of portal blood flow were produced by ligation of portal vein branches and by partial hepatectomy. All animals received 50 μCi/kg i.v. injections of methyl-^{3}H thymidine 1 hr prior to sacrifice for analysis of DNA synthesis. With excess portal blood supply, the phosphorylative activity/U of cytochrome a (+ a_3) increased to approximately 45 times/sec from control levels of 25 times/sec. Such enhancement was probably a requisite for the increased nuclear DNA synthesis that followed. Conversely, inhibition of mitochondrial hyperfunction with decreased portal flow prevented a rise in DNA synthesis. In addition, regenerative ability in mammalian livers declined in parallel with decreasing contents of respiratory enzymes in the mitochondria. In rats, rabbits, dogs, and monkeys, which have considerably larger amounts of such enzymes than those found in humans (e.g., respiratory enzymes were 3 times greater in rat liver than in human liver), the enzyme content remained unchanged during regeneration, while in regenerating human livers, amounts increased remarkably. The results indicate that in all mammalian livers there is a clear relation between portal blood supply and mitochondrial phosphorylative activities. Furthermore, these findings show that the expression of phosphorylative activity/U of cytochrome a (+ a_3) is useful since even with changed levels of respiratory enzymes found in various liver diseases, enhancement of activity is encountered more frequently in patients with an increased metabolic overload on the liver. Also, increased activity plays an important role in homeostasis for generation of energy in damaged livers.

5864 STUDIES ON THE DECREASE IN BILE FLOW PRODUCED BY SULFOBROMOPHTHALEIN.

(E.) Schulze, P. J.; Czok, G. (Inst. Pharmacol., Univ. Hamburg, Germany). *Toxicol. Appl. Pharmacol.* 28(3): 406-417, 1974.

A reduction in bile flow resulted when urethane-anesthetized male Wistar rats were infused with 1.875 mg/min BSP i.v. The infusion times at which a 50% decrease in bile flow occurred were almost the same in bile salt-depleted animals (biliary fistula for 5 hr) and in those given taurocholate (150 nM/100 g/min) during the depletion; but both infusion times were significantly lower than those observed in nondepleted rats. While the overall excretion of the dye was mainly dependent on the BSP-glutathione (GSH) fraction in the bile, the reduction in bile flow was inversely related to the amount of BSP-GSH conjugate excreted and the hepatic GSH concentrations before the infusion. A marked fall in hepatic GSH was observed after prolonged urethane narcosis, indicating that the decrease in GSH during bile salt depletion was due mainly to the effect of anesthesia. Since the infusion of equimolar and larger amounts of BSP-GSH resulted in choleresis, it is concluded that the unconjugated BSP is responsible for the reduced bile flow during BSP infusion. It is suggested that for BSP-GSH, in contrast to BSP, the rate-limiting step in the transport from blood to bile is not its biliary excretion, but its uptake by the liver.

5865 COLLAGEN PROLINE HYDROXYLASE ACTIVITY AND ^{35}S SULPHATE UPTAKE IN HUMAN LIVER BIOPSIES.

(E.) McGee, J. O'D.; Patrick, R. S.; Rodger, M. C.; Luty, C. M. (Roy. Infirm., Glasgow, Scotland). *Gut* 15(4):260-267, 1974.

To assess connective tissue biosynthetic activity in human liver disease, collagen proline hydroxylase (a key enzyme in collagen biosynthesis) and the uptake of ^{35}S sulfate (a precursor of sulfated mucopolysaccharides) were measured in hepatic tissue obtained mainly by percutaneous biopsy. A procedure is described for the quantitation of collagen proline hydroxylase in cryostat sections which allows for the simultaneous histopathological examination of the liver specimen. A 3- to 8-fold increase in the activity of this enzyme was found in 4 cirrhotic livers compared with the mean value of 4 normal livers and 2 biopsies from patients with Gilbert's syndrome. Elevated hydroxylase levels were found also in 5 patients with hepatic dysfunction but without cirrhosis (4 alcoholics and 1 patient with persistent hepatitis associated with serum smooth muscle antibody). It is suggested that the hepatic level of collagen proline hydroxylase may be a useful quantitative index of fibroblastic activity in human liver disease. Autoradiographic studies of radioactive sulfate uptake in biopsy specimens from patients with chronic liver disease showed an exaggerated incorporation of isotope not only at sites of established fibrogenesis but also in the walls of sinusoids throughout the liver.

5866 CYCLIC GUANOSINE 3', 5'-MONOPHOSPHATE AND GALLBLADDER CONTRACTION.

(E.) Amer, M. S. (Dept. Pharmacol., Mead Johnson Res. Ctr., Evansville, Ind.). *Gastroenterology* 67(2):333-337, 1974.

During investigation of the possible role of cyclic guanosine 3',5'-monophosphate (GMP) in smooth muscle contraction of the gallbladder, it was found that cholecystokinin (10^{-8} M), acetylcholine (10^{-4} M), and oxymetazoline (10^{-5} M) stimulated guanylyl cyclase activity in intact, isolated rabbit gallbladder. Cholecystokinin and acetylcholine also raised the intracellular levels of cyclic GMP in that tissue. This rise preceded and could mediate both the cholecystokinin- and acetylcholine-induced contractions. The role of cyclic GMP in mediating gallbladder contraction raises the possibility of its involvement in mediating contractions of other smooth muscles as well.

5867 EFFECT OF TYPES OF DIETARY FAT ON THE RAT LIVER. IV. FATTY LIVER.

(Pol.) Opuszynska, T. (Inst. Food Nutr., Warsaw, Poland). *Rocz. Panstw. Zakl. Hig.* 24(4):425-431, 1973.

Thaler's scale was used to evaluate the extent of fatty degeneration in livers from 444 male Wistar rats fed a diet for 4- or 15-week periods in which 38% of the calories were provided by fat. Fats were either unprocessed or had been heated for 30 min. at 180°C. They consisted of soybean oil, commercial rapeseed oil and experimental preparations low and high in erucic acid, Palma margarine, butter, and lard. Marked fatty degeneration of the liver was observed in all animals fed high-fat diets for 4 weeks, regardless of whether the fats were heated or not. Rapeseed oil produced more extensive and severe fatty changes than soybean oil. These changes became more pronounced after 15 weeks of feeding, especially in rats receiving rapeseed oil high in erucic acid. Margarine produced the least fatty change, and continuation of the high-fat diet for 15 weeks did not intensify these changes. Butter caused more severe fatty degeneration which became more pronounced after 15 weeks, particularly if the butter had been heated. Lard caused some degeneration in about 50% of the rats. Unheated lard caused severe degeneration in twice as many rats after 15 weeks than after 4 weeks, but heated lard had the same effect whether it was fed for 4 or 15 weeks.

5868 STUDIES ON THE REGULATION OF GLUTATHIONE LEVEL IN RAT LIVER.

(E.) Tateishi, N.; Higashi, T.; Shinya, S.; Naruse, A.; Sakamoto, Y. (Osaka Univ. Med. Sch., Japan). *J. Biochem. (Tokyo)* 75(1):93-103, 1974.

Starvation of male Donryu rats for 48 hr resulted in a decrease in liver glutathione content to between 2/3 and 1/2 the normal level. On refeeding, the hepatic glutathione content rapidly returned to normal, followed by a gradual increase in glucose-6-phosphate dehydrogenase (G6PD). Maintenance of the liver glutathione level was dependent on a food intake of 10 g/day. Actinomycin D (20 μg/100 g i.p.) inhibited the induction of G6PD but did not affect the increase in glutathione concentration. Cyclohexamine (25-200 μg/100 g i.p.) also failed to inhibit the increase occurring in hepatic glutathione on refeeding. Accordingly, recovery of the glutathione level after starvation does not require *de novo* formation of glutathione-synthesizing enzymes. The activities of enzymes involved in glutathione synthesis (γ-glutamylcysteine synthetase and glutathione synthetase) in the liver were similar in starved and refed rats. Hepatic cysteine and glutamate concentrations were reduced in starved animals and increased rapidly with refeeding. This may cause increased glutathione synthesis and can account quantitatively for the rapid rise of hepatic glutathione on refeeding. However, the concentration of adenine nucleotides was not favorable for glutathione synthesis in the early stage of refeeding; relatively higher concentrations of ADP and AMP were present, which could inhibit one or both of the reactions leading to glutathione synthesis. Glutathione degradation activity was lower in refed animals than in fasted ones. The turnover of hepatic glutathione was much faster in fasted than in refed rats. The degradation rate of glutathione is apparently involved in regulating the concentration of hepatic glutathione.

5869 ROUTE OF FLOW AND MICROPATHOLOGY RESULTING FROM RETROGRADE INTRABILIARY INJECTION OF INDIA INK AND FERRITIN IN EXPERIMENTAL ANIMALS. *(E.)* Bockman, D. E. (Med. Coll. Ohio, Toledo). *Gastroenterology* 67(2):324-332, 1974.

To investigate the route from the biliary system to the sinusoids, India ink (10% in saline or 8% in 4% gelatin), ferritin (10 mg/ml saline), or a mixture of both (10 mg ferritin/ml, 10% India ink) were injected into the common bile duct of mice, rats, and rabbits. All injections were performed with just enough pressure to cause retrograde flow. Tissue was prepared for light- and electron-microscopic study by routine techniques. Tracer material was fairly evenly distributed through the liver, filling many parts of the ductal system. India ink suspended in normal saline was found widely distributed in liver sinusoids. Electron microscopy showed that aggregates of platelets were sometimes associated with tracer material. Isolated small groups of hepatic cells contained dense deposits of India ink filling part or all of the cytoplasm. Marked cellular disruption was evident in electron micrographs of similar areas. It is concluded that retrograde intrabiliary injection of material disrupts hepatic cells to allow escape of tracers into sinusoids through the spaces of Disse. It is proposed that retrograde injection of such materials as radiocontrast media may cause similar micropathology and entry of biliary contents into the circulation. An understanding of this relation is especially important to predict the possible results of retrograde injections used in operative, percutaneous, and endoscopic cholangiography.

5870 EFFECT OF THE TYPE OF DIETARY FAT ON RAT LIVER. V. ALKALINE PHOSPHATASE IN THE SERUM AND LIVER. *(Pol.)* Opuszynska, T. (Inst. Food Nutr., Warsaw, Poland). *Rocz. Panstw. Zakl. Hig.* 24(5):597-603, 1973.

A high-fat diet, in which 38% of the calories were provided by fat, was fed to 6-week-old male Wistar rats for 4 or 15 weeks, and alkaline phosphatase activity was determined in their sera and liver homogenates. The fats consisted of heated and unheated soybean and rapeseed oils, Palma margarine, butter, and lard. Results were compared to those obtained from young controls. After 4 weeks of the high-fat diet, the mean serum alkaline phosphatase activity increased from 4.5 Bessey-Lowry U (controls) to 11.81 ± 1.46-15.50 ± 1.68 U for rats fed vegetable oils, 9.25 ± 2.33 U for rats fed margarine, and 11.35 ± 2.04 U for those fed lard. The mean serum alkaline phosphatase activity in rats fed butter was close to control values (6.66 ± 1.47 U). After 15 weeks the increase in activity was more pronounced: it was greatest in rats fed rapeseed oil high in erucic acid (21.03 ± 2.06 U). Soybean oil, rapeseed oil low in erucic acid, margarine, and heated butter caused smaller increases ranging from 9.53 ± 2.27 U to 15.06 ± 2.20 U. No increases were observed in rats receiving unheated butter, and only a slight increase occurred in those given lard. High-fat diets produced increases in liver alkaline phosphatase which were less pronounced than those occurring in the serum. After 15 weeks on high-fat diets, the increase in liver alkaline phosphatase activity was more pronounced in rats receiving vegetable oils and butter than in those given margarine or lard. Heated rapeseed oil and heated butter produced significant increases in alkaline phosphatase activity in the liver.

5871 THE INFLUENCE OF TAUROCHOLATE AND DEHYDROCHOLATE CHOLERESIS ON PLASMA DISAPPEARANCE AND BILIARY EXCRETION OF INDOCYANINE GREEN IN THE RAT. *(E.)* Vonk, R. J.; Veen, H.; Propr, G.; Meijer, D. K. F. (Dept. Pharmacol., Univ. Groningen, Netherlands). *Naunyn Schmiedebergs Arch. Pharmacol.* 282(4):401-410, 1974.

The pharmacokinetics of indocyanine green (ICG; 3.9 μM/kg and 12.9 μM/kg) were investigated in rats given infusion of either saline, taurocholate (106 μM/hr), or dehydrocholate (106 or 268 μM/hr). During the infusion of saline and taurocholate the plasma concentration of ICG decreased in a mono-exponential manner. However, with dehydrocholate the clearance of ICG from plasma showed two phases with different half lives. The half life of the rapid component (2.2 min) was about the same as the one found in the control experiments. After injection of 12.9 μM/kg ICG the biliary excretion of the dye increased by 138% during taurocholate administration, while an equimolar dehydrocholate infusion resulted in a mean increment of 55%. Under these circumstances the bile flow was stimulated by 195% and 297% resp. With the lower dose of ICG (3.9 μM/kg) there was no stimulation of the biliary ICG excretion with taurocholate. At this dose level an infusion of dehydrocholate (106 μM/hr) enhanced the biliary output of ICG by approximately 54%, while administration of 268 μM/hr resulted in a slight but significant decrease of 31%. These observations can be explained by assuming interaction of the bile acids with the hepatic transport of ICG at different sites. The appearance of the second component of the plasma curve during dehydrocholate infusion is possibly related to a diminished hepatic storage capacity for ICG and is not due to an effect on the primary hepatic uptake or biliary output of the dye.

5872 INFLUENCE OF THE BLOOD ETHANOL CONCENTRATION ON THE ACUTE ETHANOL-INDUCED LIVER TRIGLYCERIDE ACCUMULATION IN RATS. *(E.)* Johnson, O. (Univ. Umea, Sweden). *Scand. J. Clin. Lab. Invest.* 33(3):207-213, 1974.

To determine if the acute ethanol-induced increase in the liver triglyceride concentrations in fasted rats is influenced by blood ethanol concentration when ethanol oxidation proceeds at a maximal rate, rats fasted for 24 hr were given ethanol by continuous i.v. infusion to maintain the blood ethanol concentrations at 10 or 45 mM/liter. Control rats were given saline. The rate of ethanol oxidation was similar in the two groups having different blood ethanol concentrations. The incorporation into liver triglycerides of radioactivity from [9,10-^{3}H]oleic acid, injected through an arterial cannula in the aorta, was increased over control values to the same extent in the two ethanol-treated groups. Thus, the ethanol oxidation proceeded at a similar high rate, and a similar increase in the utilization of plasma free fatty acids for synthesis of liver triglycerides, previously proposed as a major mechanism for the development of the acute ethanol-induced fatty liver, occurred at both blood ethanol concentrations. The liver triglyceride concentrations, on the other hand, were increased in rats with 45 mM/liter ethanol in the blood but not in rats with 10 mM/liter ethanol in the blood. This could be attributed, at least in part, to a decrease in the plasma free fatty acid concentration at the low blood ethanol concentration.

5873 SECRETION OF APOLIPOPROTEINS IN VERY LOW DENSITY AND HIGH DENSITY LIPOPROTEINS BY PERFUSED RAT LIVER.

(E.) Noel, S. P.; Rubinstein, D. (Dept. Biochem., McGill Univ., Montreal, Canada). *J. Lipid Res.* 15(4):301-308, 1974.

The incorporation of labeled amino acids into the peptides of very low density lipoproteins (VLDL) and high density lipoproteins (HDL) secreted by perfused rat liver was studied using a Ringer-albumin solution in the perfusate in place of serum to diminish exchange of peptides between VLDL and HDL. The greatest release of protein, greatest incorporation of amino acid, and highest specific activity were found in VLDL. After separation of the delipidated peptides by electrophoresis on polyacrylamide gel, the incorporation into VLDL peptides was 5-10 times as great as into HDL peptides. There was virtually no incorporation into the peptides of low density lipoproteins (LDL). Approximately 25% of the radioactivity incorporated into perfusate VLDL failed to enter the 13% polyacrylamide gel. The remaining radioactivity was distributed primarily among three peptide bands: one, found in the upper portion of the gel, contained 45% of the total, most of the remainder being found in two rapidly migrating bands. These three peptides appear to approximate those of human apo-C in relative electrophoretic mobility. Most of the HDL peptide radioactivity entering the running gel was found in a band that migrates slightly faster than the main VLDL band. A portion of the radioactivity of this major HDL band did not enter the running gel unless β-mercaptoethanol was present. Greater separation of these two bands by polyacrylamide gel electrophoresis for 24 hr confirmed that the major bands in VLDL and in HDL were different. The rapidly moving peptides of HDL were found to contain very little radioactivity. Determination of the intensity of staining of carrier-free perfusate VLDL and HDL peptides produced a pattern similar to the incorporation of labeled amino acids. It is concluded that the rapidly moving peptides, which may contain activators of lipoprotein lipase, are only secreted as part of the VLDL.

5874 EFFECTS OF LONG TERM FEEDING OF CHENODEOXYCHOLIC ACID ON BIOSYNTHESIS AND METABOLISM OF BILE ACIDS IN THE RAT.

(E.) Danielsson, H.; Johansson, G. (Karolinska Inst., Stockholm, Sweden). *Gastroenterology* 67(1):126-134, 1974.

The effects of chenodeoxycholic acid on several hydroxylations in the biosynthesis and metabolism of bile acids, as well as on the composition of biliary bile acid, were studied in male Sprague-Dawley rats fed diets containing 1% chenodeoxycholic acid for up to 2 months. The hydroxylations assayed were those catalyzed by the microsomal fraction of liver homogenate in the presence of reduced nicotinamide adenine dinucleotide phosphates. The 7α-hydroxylation of cholesterol and the 12α-hydroxylation of 7α-hydroxy-4-cholesten-3-one and 5β-cholestane-3α,7α-diol were inhibited by 50% or more after feeding chenodeoxycholic acid for 2 weeks or longer. The 26-hydroxylation of 5β-cholestane-3α,7α-diol was not inhibited. The 6β-hydroxylation of taurochenodeoxycholic acid and lithocholic acid was stimulated by about 50% after 4 weeks of feeding chenodeoxycholic acid. The extent of stimulation was somewhat greater after 8 weeks. The 7α-hydroxylation of taurodeoxycholic acid was stimulated 20-80% by chenodeoxycholic acid. The effects of chenodeoxycholic acid on the various hydroxylations were readily reversible. Thus, the rates of the different hydroxylations in rats fed chenodeoxycholic acid for 3 and 8 weeks and a control diet for 1 week did not differ significantly from those of corresponding controls. Similarly, in rats fed chenodeoxycholic acid for 3 weeks and subjected to bile drainage and starvation for 2 days, the extent of stimulation of 7α-hydroxylation of cholesterol and 12α-hydroxylation of 7α-hydroxy-4-cholesten-3-one was the same as in the controls. The composition of biliary bile acids was determined after 3 weeks of feeding chenodeoxycholic acid. Cholic acid and deoxycholic acid were virtually absent. However, after 1 day of biliary drainage, rats previously fed chenodeoxycholic acid started to synthesize cholic acid.

5875 PYRUVATE CARBOXYLASE IN HUMAN LIVER: APPARENT LOSS OF A COMPONENT OF CATALYTIC ACTIVITY IN A FORM OF LACTIC ACIDOSIS WITH HYPOGLYCEMIA.

(E.) Delvin, E.; Scriver, C. R.; Neal, J. L. (Montreal Shriners Hosp. Crippled Child., Canada). *Biochem. Med.* 10(2):97-106, 1974.

Pyruvate carboxylase activity in human liver was measured by a modification of the method of Utter and Keech. The enzyme is located in mitochondria. Activity in homogenates at a final dilution of 1:100 is directly proportional to time of incubation and amount of tissue incubated. Concentration-dependent kinetics with pyruvate between 0.1 mM and 10 mM, and in the presence of 0.7 mM acetyl-coenzyme A, reveal a low-Km component (Km, 0.3 mM) and a high-Km component (2.4 mM). When the observed total activity is resolved into two discrete components the corrected Km values are 0.4 and

3.7 mM, resp. A neonate with intermittent lactic acidosis, associated with fasting hypoglycemia, and hyperpyruvicacidemia (1 mM *versus* normal value of 0.1 mM) had deficient pyruvate carboxylase activity, with a missing low-Km component. These findings indicate considerable complexity in the catalytic function for pyruvate carboxylation in human liver.

5876 PROSTAGLANDIN E_1 EFFECTS ON ETHANOL METABOLISM IN THE RAT. *(E.)* Lalyre, Y.; Scruggs, W.; Wilson, D. E. (Univ. Illinois Med. Ctr., Chicago). *Prostaglandins* 6(6):489-494, 1974.

The effect of prostaglandin E_1 (0.8 mg/kg s.c.) on the metabolism of a single intragastric dose of alcohol (6 g/kg) given to Sprague-Dawley rats that had been previously maintained on a normal diet or on an alcohol-supplemented diet was studied. Neither acute nor chronic administration of prostaglandin E_1 affected the disappearance of alcohol from blood of animals fed either the control or the alcohol diet. Prostaglandin E_1 did not affect alcohol dehydrogenase activity of either group of animals. These studies suggest that the protective effect of prostaglandin E_1 on alcohol-induced fatty liver in rats is not related to a direct action on alcohol metabolism. In other experiments, animals received diets containing known concentrations of specific fatty acids. Animals fed diets deficient in essential fatty acids, thus preventing prostaglandin synthesis, and fed alcohol without prostaglandin E_1 supplementation were unable to release fatty acids deposited in the liver. This suggests that the major action of prostaglandin E_1 may be on the hepatic release of lipids.

5877 THE EFFECT OF SEX ON CERTAIN PROPERTIES OF THE VERY LOW DENSITY LIPOPROTEIN SECRETED BY THE LIVER. *(E.)* Wilcox, H. G.; Woodside, W. F.; Breen, K. J.; Knapp, H. R.; Heimberg, M. (Vanderbilt Univ. Sch. Med., Nashville, Tenn.). *Biochem. Biophys. Res. Commun.* 58(4):919-926, 1974.

Livers from normal fed male and female Holtzman rats were perfused with a diluted blood-buffer medium containing 0-1773 μM oleic acid in the form of a complex with bovine serum albumin. Over a wide range of free fatty acid concentrations, livers from female rats secreted greater quantities of triglyceride into the perfusate than did livers from male rats. This greater potential of the female to esterify free fatty acids to triglyceride undoubtedly stimulates increased output of VLDL, which is the primary transport form for triglyceride from the liver. The inherently greater capacity of livers from female rats to secrete triglyceride is probably the result of certain hormonally mediated control mechanisms. The hormones which may be responsible probably include gonadal steroids and pituitary gonadotrophins. The very low density lipoprotein (VLDL) carrier for triglyceride secreted by livers from female rats was a larger particle and contained less phospholipid and sterol/mol triglyceride than the VLDL secreted by livers from male rats. Since plasma triglyceride concentrations in female rats are similar to or lower than those in male rats, the greater output of triglyceride VLDL in females suggests that sex-dependent differences in the rates at which VLDL triglyceride is utilized *in vivo* may be related to the lipid composition and physical properties of the VLDL secreted by the liver.

5878 EFFECT OF THEOPHYLLINE ON HEPATIC EXCRETORY FUNCTION. *(E.)* Barnhart, J. L.; Combes, B. (Univ. Texas Southwestern Med. Sch., Dallas). *Am. J. Physiol.* 227(1):194-199, 1974.

Theophylline administered i.v. to anesthetized dogs in an average dose of 17.0 mg/kg resulted in increases in bile flow from the value for control animals of 0.167 ml/min to that for treated animals of 0.240 ml/min and in proportionate increases in biliary clearance of erythritol-^{14}C, but no increase in bile salt excretion. These results confirm earlier findings that theophylline-induced choleresis is canalicular in origin and is independent of bile salt excretion. In addition, the studies demonstrated that theophylline and its metabolites are excreted into bile, but in amounts insufficient to account *via* their osmotic effects for the increase in bile flow. Maximum rates of excretion of sulfobromphthalein sodium (BSP T_m) did not change significantly during theophylline-induced choleresis. This latter observation provided strong evidence that taurocholate-induced enhancement of BSP T_m found in previous studies is related to taurocholate excretion *per se* rather than to increased canalicular bile flow induced by taurocholate excretion.

5879 THE STUDY OF BILE SALT KINETICS IN THE EXPERIMENTAL ANIMAL USING A NEW TECHNIQUE. *(E.)* Deitrick, J. E.; McSherry, C. K.; Thorbjarnarson, B.; Glenn, F. (New York Hosp.-Cornell Med. Ctr., N.Y.). *J. Surg. Res.* 16(5):559-563, 1974.

An animal model which will permit ease of bile sampling in the presence of an intact functioning biliary system for both short- or long-term experiments without reliance upon indwelling catheters has been developed. Six female baboons underwent cholecystopexy, a procedure which secures the fundus of the gallbladder to the right anterior abdominal wall. A right paramedian incision was employed, and a 1.5-cm button of peritoneum excised from the right anterior abdominal wall in the area immediately overlying the fundus of the gallbladder as it projects beyond the liver edge. The fundus of the gallbladder was then sutured to the cut edge of peritoneum to secure it to the anterior abdominal wall. The site of the cholecystopexy was marked by securing a stainless steel wire suture in the anterior rectus fasia of the abdominal wall directly overlying the fundus of the gallbladder. The wire was palpated through the skin and the abdomen then closed in layers. Bile samples were obtained by percutaneous aspiration of the gallbladder with needle and syringe 10 days postoperatively. The data obtained confirm that the gallbladder functions normally following cholecystopexy and suggests that cholic and chenodeoxycholic acids may vary independently in their kinetic activity. It is suggested that this experimental model will be very useful for the study of drug-induced changes in the composition of bile.

5880 ARGINASE ACTIVITY, ARGININE AND ORNITHINE OF PLASMA IN EXPERIMENTAL LIVER DAMAGE. *(E.)* Cacciatore, L.; Antoniello, S.; Valentino, B.; De Ritis, F. (Sch. Med., Univ. Naples, Italy). *Enzyme* 17(5):269-275, 1974.

In the acute phase of CCl_4 poisoning due to i.p. administration of 10% CCl_4 (1.30 ml/100 g) to Sprague-Dawley male rats, a marked increase occurred in plasma arginase activity together with a simultaneous significant increase in ornithine and disappearance of arginine. To confirm the metabolic action of arginase at the plasma level, normal rat plasma containing arginine but almost no arginase and poisoned rat plasma containing arginase (over 4000 IU) without arginine were incubated together at 37 C for 30 min. Following incubation, arginine disappeared completely and ornithine increased significantly. No significant change in urea concentration was noted. The data show that concurrently with effects of CCl_4 on catabolic sequence of the urea cycle in liver cells arginine disappears from the plasma with probable further damage to the ammonia detoxification mechanism. Results also demonstrated that liver arginase which increases during necrotic liver damage still acts at the plasma level to transform arginine into ornithine and urea.

5881 A PHYSIOLOGICAL MODEL TO STUDY GALLBLADDER FUNCTION IN PRIMATES. *(E.)* O'Brien, J. J.; Shaffer, E. A.; Williams, L. F.; Small, D. M.; Lynn, J.; Wittenberg, J. (Boston Univ. Med Ctr., Mass.). *Gastroenterology* 67(1):119-125, 1974.

A primate model employing awake cholecystopexed baboons has been designed to permit quantitative studies of gallbladder function and its influence on the hepatic secretion of bile salts. Duodenal perfusion with ^{3}H-inulin measures total bile salt output into the duodenum, while periodic percutaneous sampling of gallbladder bile labeled with ^{14}C-inulin permits quantitation of changes in volume and bile composition in the gallbladder. The appearance of ^{14}C-inulin in the duodenum quantitates gallbladder emptying. The presence of the catheter does not change the gallbladder's ability to concentrate either radiographic dye or bile salts, nor does it interfere with or induce contraction. During fasting, hepatic bile salt secretion was low (about 5 µM/min) with less than ½ the output entering the gallbladder. No gallbladder contents appeared in the duodenum until contraction was induced by cholecystokinin. However, after gallbladder contraction with mobilization of the bile salt pool, hepatic bile salt secretion increased 2- to 4-fold. The preliminary data suggest that gallbladder filling and emptying play a role in governing the movement of bile salts around the enterohepatic circulation.

5882 ENZYME ACTIVITIES OF THE PERFUSED EX-VIVO PORCINE LIVER: IMPORTANCE OF A PHYSIOLOGICAL PERFUSATE. *(E.)* Baker, P. R.; Cuschieri, A. (Dept. Surg., Univ. Liverpool, England). *Scand. J. Gastroenterol.* 9(1):65-71, 1974.

To determine possible causes for failure of liver preservation by perfusion techniques, the activities of 5 cytoplasmic enzymes (pyruvate kinase, aldolase, glucose-6-phosphate dehydrogenase, sorbitol dehydrogenase, and isocitrate dehydrogenase) were studied in homogenates of *ex-vivo* pig livers perfused by isolated or auxiliary perfusion. In the isolated perfusion system, livers were supplied with diluted blood through a completely artificial circuit with no replenishment of essential constituents. In the other system, livers received blood maintained in a physiological condition by living donor pigs. With auxiliary perfusion livers had normal to high enzyme activities. Activities of all 5 enzymes were lower in the isolated perfused livers, with especially low levels of fructose diphosphate-stimulated pyruvate kinase, sorbitol dehydrogenase, and isocitrate dehydrogenase. The decrease in pyruvate kinase activity was probably due to a deficiency in the L form of this enzyme since activity was abnormally low only with added fructose diphosphate. Because this enzyme plays a key role in glycolysis, its reduced activity may be partly responsible for the observed functional impairment in the isolated perfused liver. These results indicate that the type of perfusion system, and in particular the quality of the perfusate, determines whether enzymes involved in metabolic processes will be present in normal or reduced amounts in hepatic cells. This in turn must influence the extent to which the perfused liver can function in a normal capacity.

5883 SPECTRAL STUDIES ON THE RAPID UPTAKE AND SUBSEQUENT BINDING OF DRUGS TO CYTOCHROME P-450 IN ISOLATED RAT LIVER CELLS. *(E.)* Von Bahr, C.; Vadi, H.; Grundin, R.; Moldeus, P.; Orrenius, S. (Karolinska Inst., Stockholm, Sweden). *Biochem. Biophys. Res. Commun.* 59(1):334-339, 1974.

The rate of formation of type I spectral change, resulting from the formation of a cytochrome P-450-substrate complex, was studied in suspensions of isolated rat liver cells after addition of 5.3 mM of hexo-, amo-, hepta-, and butobarbital. Results obtained with liver hepatocytes were compared with those obtained with liver homogenates and microsomes. This study was primarily designed to determine whether hepatic drug uptake occurs by passive diffusion or involves an energy-consuming process. Complex formation between the drug and cellular cytochrome P-450 was rapid and occurred within a few seconds but was considerably slower than that with homogenates or microsomes. Preincubation of the isolated liver cells with rotenone, which decreases cellular ATP to 5-10%, had little effect on the rate of formation of hexobarbital-produced type I spectral change. The effect of temperature on the rate was moderate ($Q_{10}=1.3$). Studies with the different barbitals showed a relation between the rate of drug-cytochrome complex formation and the lipid solubility of the drug used. It was concluded from these findings that drug uptake into the hepatocytes occurs by a non-energy-requiring diffusion process.

5884 EFFECT OF PHENOBARBITAL ADMINISTRATION ON THE SUBCELLULAR DISTRIBUTION OF VITAMIN D_3-^{3}H IN RAT LIVER. *(E.)* Hahn, T. J.; Scharp, C. R.; Avioli, L. V. (Jewish Hosp. St. Louis, Mo.). *Endocrinology* 94(6):1489-1495, 1974.

The effect of phenobarbital on *in vivo*, hepatic subcellular uptake of vitamin D_3 was studied in 6-week-old male Wistar rats. Phenobarbital (75 mg/kg/day i.p.) was administered for 5 days and on the 6th day 5 U of 1,2-^{3}H-labeled vitamin D_3 in 0.1 ml rachitic rat serum were injected into the jugular veins of treated and control animals. Animals were sacrificed 30 and 90 min after injection, their livers were homogenized and separated into subcellular fractions by centrifugation procedures, and the different fractions were analyzed for protein content and radioactivity. Phenobarbital treatment did not significantly affect total liver uptake of the vitamin, but subcellular distribution of the vitamin was markedly altered. In phenobarbital-treated animals, radioactivity associated with the smooth endoplasmic reticulum was significantly increased and that associated with the mitochondrial fraction significantly decreased after both 30 and 90 min. Increased binding of vitamin D_3 by smooth endoplasmic reticulum in the treated animals correlated well with increased content of smooth endoplasmic reticulum protein. Comparison of smooth endoplasmic reticulum uptake of labeled vitamin D_3 after 30 and 90 min suggests that the rate at which the smooth endoplasmic reticulum metabolizes vitamin D_3 is increased in phenobarbital-treated rats. Chromatography of the radioactivity associated with the various cell fractions showed significantly increased production of polar vitamin D_3 metabolites by the smooth endoplasmic reticulum in the treated animals. The increased conversion to polar products and decreased mitochondrial uptake of vitamin D after phenobarbital treatment may be significant in the pathogenesis of drug-induced osteomalacia.

5885 EFFECTS OF INHIBITORS OF PROTEIN AND RIBONUCLEIC ACID SYNTHESIS ON α-NAPHTHYLISOTHIOCYANATE-INDUCED HYPERBILIRUBINEMIA, SULFOBROMOPHTHALEIN RETENTION AND PROLONGATION OF PENTOBARBITAL HYPNOSIS. *(E.)* Indacochea-Redmond, N.; Witschi, H.; Plaa, G. L. (Fac. Med., Univ. Montreal, Canada). *J. Pharmacol. Exp. Ther.* 189(1):278-284, 1974.

The effects of pretreatment with inhibitors of protein and/or RNA synthesis on hyperbilirubinemia, BSP retention, and prolongation of pentobarbital narcosis induced by α-naphthylisothiocyanate (ANIT, 300 mg/kg p.o.) were studied in Holtzman rats. Actinomycin D, cyclohexamide, and ethionine markedly decreased or inhibited ANIT-induced hyperbilirubinemia even at doses much lower than those commonly used for inhibition or protein and/or RNA synthesis. Minimum inhibitory i.p. doses were 50 µg/kg actinomycin D, 0.05 mg/kg cyclohexamide, and 50 mg/kg ethionine. None of these inhibitors had any effect on BSP retention measured 2 hr after ANIT administration. However, if BSP retention was assessed 24 hr after ANIT, a significant inhibition was produced by pretreatment with 100 µg/kg actinomycin D, 2 mg/kg cyclohexamide, and 400 mg/kg ethionine. When the animals were pretreated (45 mg/kg for males and 30 mg/kg for females i.p.) 1 hr before ANIT, none of the inhibitors studied had an effect on prolongation of pentobarbital sleeping time produced by ANIT. These results suggest that unimpaired protein synthesis may be involved in some of the hepatotoxic effects of ANIT but not in others. The events that lead to hyperbilirubinemia and cholestasis after ANIT are apparently unrelated to those responsible for BSP retention and prolongation of pentobarbital narcosis.

5886 EFFECT OF RENAL DENERVATION AND α-ADRENERGIC BLOCKAGE ON SODIUM EXCRETION IN DOGS WITH CHRONIC LIGATION OF THE COMMON BILE DUCT. *(E.)* Chaimovitz, C.; Massry, S. G.; Friedler, R. M.; Coburn, J. W. (Cedars-Sinai Med. Ctr., Los Angeles, Calif.). *Proc. Soc. Exp. Biol. Med.* 146(3):764-770, 1974.

Chronic ligation of the common bile duct in dogs causes sodium retention and a blunted natriuretic response to extracellular volume expansion. Since increased sympathoadrenal activity plays an important role in other sodium-retaining states, the present study was undertaken to evaluate the role of renal denervation and α-adrenergic blockade on the renal handling of sodium in dogs with chronic ligation of the common bile duct. Renal denervation was accomplished by stripping all visible nerves from the left renal artery of 6 dogs and coating with phenol. Dibenzyline infusion was carried out with the left renal artery in amounts sufficient to deliver 3.6 µg/min in 3 dogs and 15 µg/min in 3 other dogs. Extracellular volume expansion was produced with i.v. infusion of 0.45% NaCl. Six normal dogs were used as controls. Urinary excretion of creatinine, *p*-aminohippurate, and sodium was followed. Neither renal denervation or dibenzyline infusion affected creatinine or *p*-aminohippurate clearance. Both produced a slight but significant increment in urinary sodium excretion, but these changes were not different from those observed after renal denervation in normal animals. Also, these procedures did not improve the response to saline infusion in dogs with chronically ligated common bile ducts. These data indicate that the sympathoadrenal activity does not play an important role in the salt-retaining state that follows chronic ligation of the common bile duct.

5887 INHIBITION OF RELEASE OF HEPATIC TRIGLYCERIDE BY ETHANOL: A REAPPRAISAL. *(E.)* Annable, W.; Cooper, C. (Dept. Biochem., Case Western Reserve Univ., Cleveland, Ohio). *Biochem. Pharmacol.* 23(14):2063-2068, 1974.

Administration of ethanol (2 g/kg i.p.) to male Sprague Dawley rats, starved for 48 hr, increased hepatic triglyceride levels from 4 to 9 mg/g liver within 90 min; levels normalized 24 hr after ethanol injection. Peak levels of plasma ethanol of 200 mg/100 ml were reached within 1 hr, and alcohol was completely absent at 7 hr, with increased levels of hepatic lipids persisting for 24 hr. When Triton WR 1339, used to prevent the action of clearing factor lipase on plasma lipoproteins, was administered (100 mg/g i.v.), serum triglycerides increased linearly from 70 to 260 mg/100 ml within 90 min after injection. However if ethanol was injected 2 hr before Triton, plasma triglyceride levels (40 mg/100 ml at time of Triton administration) rose to only 80 mg/100 ml within 90 min. Over an 8 hr period, this depression of Triton-induced hyperlipidemia persisted until ethanol disappeared from the blood within 7 hr. Except for the lag period, the degree of hyperlipidemia inhibition roughly paralleled changes in plasma ethanol values. It is concluded that ethanol inhibits the movement of triglycerides out of the liver and that this inhibition may be related to the plasma ethanol concentration. The data presented are sufficient to warrant reappraisal of current views regarding ethanol-induced fatty liver.

5888 HORMONE-SENSITIVE ADENYLATE CYCLASE ACTIVITY AS A MARKER TO DISTINGUISH BETWEEN BLOOD SINUSOIDAL AND BILE CANALICULAR SURFACE FRAGMENTS IN RAT LIVER PLASMA-MEMBRANE SUBFRACTIONS. *(E.)* Wisher, M. H.; Evans, W. H. (Natl. Inst. Med. Res., London, England). *Biochem. Soc. Transact.* 2(3):407-408, 1974.

Six cell membrane subfractions from 3 rat livers were prepared: 3 by rate-zonal and density-gradient centrifugation (light, heavy A, and heavy B subfractions) and 3 by flotation in sucrose gradients followed by density-gradient centrifugation (nuclear light, nuclear heavy, and microsomal light subfractions). Electron microscope examination showed a vesicular composition of the 3 light subfractions, while the heavy A and B contained many membrane strips associated with desmosomes and gap junctions; the nuclear heavy subfraction was composed of both vesicles and junctional complexes. Since hormone-sensitive adenylate cyclase activity is theoretically localized at or near the blood sinusoidal surface of hepatocytes, this enzyme was used to determine the origin of subfraction fragments, whether from blood sinusoidal, bile canalicular or intercellular surface. The addition of glucagon to each subfraction increased basal adenylate cyclase activity 3-fold in heavy A and B, 4-fold in nuclear light and heavy, and 9-fold in microsomal light subfractions. No glucagon response occurred in the light subfraction. These results suggest that the microsomal light subfraction, showing highest stimulation by glucagon, contains plasma membrane fragments from the blood sinusoidal surface. The absence of glucagon stimulation in the light fraction indicates its components originate from the bile canalicular surface. Response to glucagon, together with presence of intercellular junctions, showed that the 3 heavy subfractions (nuclear heavy, heavy A, and heavy B) contain fragments derived predominantly from the intercellular and adjacent blood sinusoidal surfaces. The procedures used here are particularly appropriate for the preparation of biochemically characterized fractions, each containing specific plasma membrane fragments from the 3 main surface domains of hepatocyte cell membranes.

5889 STUDIES ON THE APPEARANCE OF A COPPER-BINDING PROTEIN IN RAT LIVER. *(E.)* Bremner, I.; Davies, N. T. (Rowett Res. Inst., Aberdeen, Scotland). *Biochem. Soc. Transact.* 2(3):425-427, 1974.

Male rats were injected i.p. with 100 or 300 μg Cu^{++} (as CuSO$_4$ in physiological saline) to determine whether Cu plays a role in controlling the synthesis or degradation of a Zn- and Cu-containing metallothionein-like fraction in the liver (fraction III). Although large individual variations were observed, hepatic contents of both Cu and Zn increased in rats sacrificed 8 hr. after 100μg Cu^{++} injection. Cu and Zn were found together in fractions I, II, and III separated from liver cytosol by gel filtration on Sephadex G-75. The molecular weights of these fractions were approximately 65,000, 35,000, and 12,000 resp. The combined Cu and Zn content of fraction III was directly related to the hepatic Zn content. Injection of 300μg Cu^{++} produced qualitatively similar effects on hepatic Zn and Cu contents, but variability was greatly decreased. Hepatic Cu contents increased gradually throughout the observation period, while Zn contents began to increase 2 hr after administration of Cu^{++}. Initially, Cu accumulated mainly in fraction I, while the Cu content of fraction III increased progressively with time, the largest increases occurring after a decrease in the Cu content of fraction I and simultaneously with an increase in the heaptic Zn content and the appearance of Zn in fraction III. To determine whether Cu induces fraction III independently of Zn, these experiments were repeated on rats which had been kept on a Zn-deficient diet for 21 days. Although the hepatic Zn content did not increase after administration of Cu^{++}, the Cu content of fraction III increased more rapidly than in rats fed a normal diet. About 50% of the increase in the hepatic Cu content 7.5 hr after administration of Cu^{++} was found in fraction III, suggesting that this component may play some functional role in Cu metabolism. When cycloheximide was injected simultaneously with 300 μg Cu^{++} into Zn-deficient rats at a dose that almost completely inhibited amino acid incorporation into hepatic proteins, the amount of Cu in fraction III was inhibited by about 90% 5 hr after injection, but the increase in the hepatic Cu content was reduced by only 20%. These observations indicate that injection of Cu^{++} promotes the synthesis of a low-molecular weight metal-binding protein by a mechanism requiring active protein synthesis. These results conflict with others reported in the literature for ruminants. This conflict may result from species differences or the fact that the ruminant study was performed on animals in equilibrium with respect to their Zn and Cu status, whereas the present research dealth with dynamic changes following acute Cu^{++} administration.

5890 ISOLATION AND CHARACTERIZATION OF BILIARY METABOLITES OF ESTRIOL IN THE RAT. *(E.)* Nambara, T.; Ishiguro, J.; Kawarada, Y.; Tajima, H. (Pharm. Inst., Tohoku Univ., Japan). *Chem. Pharm. Bull. (Tokyo)* 22(4):889-893, 1974.

5891 PREVENTION BY CYSTAMINE OF THE RAT LIVER POLYSOMAL DISAGGREGATION INDUCED BY CARBON TETRACHLORIDE (CCl$_4$). *(E.)* Corongiu, F. P.; Dessi, S.; Sanna, A.; Congiu, L. (Inst. Gen. Pathol., Univ. Cagliari, Italy). *Experientia* 30(5):531-532, 1974.

5892 EFFECT OF PREGNENOLONE-16 α-CARBONITRILE ON MITOTIC ACTIVITY IN THE INTACT AND REGENERATING RAT LIVER. *(E.)* Japundzic, M.; Garg, B. D.; Kovac, K.; Japundzic, I. (Inst. Med., Exp. Surg., Univ. Montreal, Canada). *Experientia* 30(5):562-563, 1974.

5893 INDUCTION OF TYROSINE AMINOTRANSAMINASE AND ORNITHINE DECARBOXYLASE IN ISOLATED PERFUSED REGENERATING RAT LIVER. *(E.)* Fukui, N.; Fujita, A.; Ohtsuka, H.; Miura, Y. (Chiba Univ. Sch. Med., Japan). *J. Biochem. (Tokyo)* 75(4):867-873, 1974.

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5944 DIET AND GALLSTONE FORMATION. *(E.)* Carlisle, V. (Univ. Auckland Med. Sch., New Zealand). *NZ Med. J.* 79(5/6):983, 1974.

5945 EFFECT OF SEVERAL ENDOGENOUS SUBSTANCES— INCLUDING PORPHYRINS, HEMATIN, AND CARBON MONOXIDE— ON HEPATIC CLEARANCE OF SULFOBROMOPHTHALEIN. *(E.)* Waters, L. R.; Roberts, R. J. (Toxicol. Ctr., Univ. Iowa, Iowa City). *Toxicology* 2(3):223-229, 1974.

5946 STUDIES ON MYOINOSITOL IX. MORPHOLOGICAL EXAMINATION OF THE EFFECT OF MASSIVE DOSES OF MYOINOSITOL ON THE LIVER AND KIDNEY OF RAT. *(E.)* Hasan, S.; Nishigaki, I.; Tsutsui, Y.; Yagi, K. (Fac. Med., Univ. Nagoya, Japan). *J. Nutr. Sci. Vitaminol.* 20(1):55-58, 1974.

5947 AN ULTRASTRUCTURAL STUDY OF CARBON DISULPHIDE INDUCED LIVER INJURY IN THE RAT. *(E.)* Butler, W. H.; Chandra, S. V.; Magos, L. (Med. Res. Council Labs., Surrey, England). *J. Pathol.* 112(3):147-152, 1974.

5948 THE LIVER AND THE DIABETOGENIC EFFECT OF THE GROWTH HORMONE. *(E.)* Milcu, S. M.; Costiner, E. (no affil.). *Rev. Roum. Endocrinol.* 10(5):429-439, 1973.

See also, 5792, 5842, 5851, 5973, 5976, 5977, 5979, 5985, 6018, 6324, 6353, 6356, 6369.

5949 BIOGENESIS OF BRUSH BORDER MEMBRANES: ALKALINE PHOSPHATASE AND AMINOPEPTIDASE AND THEIR POSSIBLE PRECURSOR PROTEINS AFTER X-RAY IRRADIATION OF SMALL INTESTINE OF C3H MICE. *(E.)*

Wachsmuth, E. D.; Torhorst, A. (Friedrich Miescher-Inst., Basel, Switzerland). *Beitr. Pathol.* 51(3):234-247, 1974.

The previous findings of putative precursor proteins of the brush border membrane enzymes in the apical cytoplasm of crypt cells of the small intestine, and of proximal convoluted tubules of the kidney, was subjectd to confirmation by experiments in which 1200 r x-ray abdominal irradiation was used to affect protein synthesis. The test animals used were 10-12 week old C3H mice. The enzymes studied were alkaline phosphatase and aminopeptidase. Active forms of the enzymes were analyzed in homogenates and their locations in tissue sections was determined by histochemical methods. The inactive putative precursors were localized by an immuno-histochemical method. An effect of x-ray irradiation could be seen only in the small intestine, not in the kidney. In the early degeneration phase resulting from the irradiation, both the putative precursor proteins and the active enzymes increased. In the late degeneration phase, the putative precursors disappeared first from the crypts of the duodenum and the ileum, followed by the disappearance of the active enzymes from the brush border membranes of the villi. In the regeneration phase, the putative precursors had already reappeared at the time when the active enzymes became detectable in the villi membranes. The appearance of cytoplasmic putative precursors proteins thus appeared to be a prerequisite for the appearance of brush border membrane enzymes. This was consistent with the putative precursors being true precursors of the active enzymes.

5950 SUBCELLULAR LOCALIZATION OF ENTEROKINASE IN HUMAN SMALL INTESTINE. *(E.)*

Schmitz, J.; Preiser, H.; Maestracci, D.; Crane, R. K.; Troesch, V.; Hadorn, B. (Rutgers Med. Sch., Piscataway, N.J.). *Biochim. Biophys. Acta* 343(3):435-439, 1974.

Brush border membrane was isolated from homogenized human intestinal mucosa by centrifugal fractionation and was assayed for enterokinase, using sucrase and alkaline phosphatase as markers. It was found that enterokinase activity in man as in the rat, guinea pig, and pig, occurs in close association with the brush border membrane. However, a second localization may exist since a fraction of the mucosal homogenate containing only small amounts of brush border but large amounts of endoplasmic reticulum, basolateral membranes, and mitochondria contained a disproportionately high amount of enterokinase. The enzyme in this particulate fraction occurred in a not fully active form. The finding of the second localization may explain the fact that enterokinase is unaffected or less decreased than other brush border enzymes in patients with active celiac disease and a flat mucosa.

5951 EXTRACORPOREAL PERFUSION OF EXCISED CANINE SMALL BOWEL SEGMENTS. *(E.)*

Grenier, J. F.; Dauchel, J.; Eloy, M. R. (Munic. Hosp., Strasbourg, France). *Digestion* 10(1):82-94, 1974.

A surgical procedure is described for isolating and artificially perfusing a segment of the dog small bowel with whole blood or a suspension of erythrocytes in a culture medium. Techniques of removal without ischemia and catheterization of the lymphatic vessels are reviewed. Such a preparation may be useful for studies of aspects of small bowel metabolism, particularly the absorptive process and external or internal secretions. The procedure also provides a tool for assessing the electrical and mechanical activities of the intestine and the requirements of its blood flow circulation. Intestinal extracorporeal perfusion makes it possible to collect and measure intestinal secretions, even if produced in small volume, because numerous samples of blood, lymph, and tissue are available for a great number of investigations. Further, effects of various stimuli may be investigated with a minimum of interaction and studies may be performed on segments taken at all the levels of the small bowel. It was suggested that this preparation can be adapted to future transplantation surgery and utilized as a means of storing organs prior to grafting.

5952 DEVELOPMENT AND DISTRIBUTION OF LYSOSOMAL ENZYMES AND DISACCHARIDASES IN HUMAN FETAL INTESTINE. *(E.)*

Antonowicz, I.; Chang, S. K.; Grand, R. J. (Harvard Med. Sch., Boston, Mass.). *Gastroenterology* 67(1):51-58, 1974.

The development and topographic distribution of some lysosomal enzymes (α-glucosidase, β-glucosidase, β-galactosidase, β-glucuronidase, N-acetyl-β-glucosaminidase, arylsulfatase, and acid phosphatase) and 4 disaccharidases (lactase, sucrase, maltase, and palatinase) were studied in human fetuses (10-24 weeks old). The specific activities of these enzymes were compared with those of a premature baby (28 weeks gestation) and a baby born at term (39 weeks), as well as those observed in children (aged 2-11 months). The ranges of specific activities of all enzymes except lactase were comparable to those in older infants, even at the earliest time point studied. The topographies of the disaccharidases and α-glucosidase (lysosomal enzyme, assayed at pH 4.0) were similar: the highest activity was found in the proximal jejunum and levels decreased significantly along the rest of the small intestine. β-Galactosidase, β-glucuronidase, N-acetyl-β-glucosaminidase, and acid phosphatase showed maximum activity in the middle section of the small intestine, while β-glucosidase activity was sustained at a high level through both the proximal and middle small intestine, but fell distally. Arylsulfatase activity was essentially constant along the entire small intestine. This investigation clearly demonstrates the early maturation of the lysosomal enzyme system in the small intestine, and suggests that differentiation of these enzymes may be required for normal cell function in developing intestinal mucosa.

5953 FATTY ACID-BINDING PROTEIN IN SMALL INTESTINE. IDENTIFICATION, ISOLATION, AND EVIDENCE FOR ITS ROLE IN CELLULAR FATTY ACID TRANSPORT.

(E.) Ockner, R. K.; Manning, J. A. (Univ. California Sch. Med., San Francisco). *J. Clin. Invest.* 54(2): 326-338, 1974.

A soluble fatty acid-binding protein, molecular weight about 12,000, present in intestinal mucosa and other tissues that utilize fatty acids (including liver, myocardium, adipose, and kidney) was found to bind long chain fatty acids both *in vivo* and *in vitro*. This protein was isolated from the small intestines of male Sprague-Dawley rats by gel filtration and isoelectric focusing. It showed a reaction of complete immunochemical identity with proteins in the 12,000 molecular weight fatty acid-binding fractions of liver, myocardium, and adipose tissue supernates. However, the presence of immunochemically nonidentical 12,000 molecular weight fatty acid-binding protein in these tissues was not excluded. By quantitative radial immunodiffusion, the supernatant concentration in mucosa from the proximal and middle thirds of the jejuno-ileum significantly exceeded that in the distal third, as well as in the duodenum and liver, expressed as μg/mg soluble protein, μg/g DNA, and μg/g tissue. The fatty acid-binding protein concentration in villi was approximately 3 times greater than the crypts. Small quantities of this protein were present in fractions of washed nuclei-cell membranes, mitochondria, and microsomes. However, the amount of the protein solubilized/mg membrane protein was similar for all particulate fractions, and total membrane-associated fatty acid-binding protein was only about 16% of the supernatant fatty acid-binding protein. Intestinal concentration of this protein was significantly greater in animals maintained on high fat diets than on low fat; saturated and unsaturated fat diets did not differ greatly in this regard. The preponderance of fatty acid-binding protein in villi from the proximal and middle intestine, its ability to bind fatty acids *in vivo* as well as *in vitro*, and its response to changes in dietary fat intake, all support the concept that this protein participates in cellular fatty acid transport during fat absorption. Identical or closely related 12,000 molecular weight proteins may serve similar functions in other tissues.

5954 THE EFFECT OF BICARBONATE AND ACIDIFICATION ON WATER AND ELECTROLYTE ABSORPTION BY THE INTESTINE OF NORMAL AND INFECTED (Hymenolepis diminuta:Cestoda) RATS.

(E.) Podesta, R. B.; Mettrick, D. F. (Dept. Zool., Univ. Toronto, Canada). *Am. J. Dig. Dis.* 19(8):725-735, 1974.

Saline solutions differing in hydrogen ion and bicarbonate concentration were perfused *in vivo* into the jejunum and proximal and distal ileum of both uninfected and parasitized rats (*Hymenolepis diminuta*). In both the parasitized and uninfected animals, the jejunum and proximal ileum were acidified *via* a hydrogen-ion secretory mechanism, as was the infected distal ileum. The intestinal lumen was further acidified in infected rats since *H. diminuta* secretes hydrogen ions. Bicarbonate stimulated absorption of sodium, bicarbonate, and fluid in the uninfected jejunum, in all the regions of the infected intestine, and also by the parasites. This accelerating effect of bicarbonate was pH-sensitive; it is considered of questionable importance in the acidic postprandial proximal intestine. When the pH of the luminal fluid was lowered, intestinal absorption of salt and water diminished, or a net secretion of isotonic fluid occurred. The distal ileum was less sensitive to pH changes. Low luminal pH stimulated water and electrolyte absorption by *H. diminuta*, but absorption was reduced in all 3 regions of the infected small intestine, due either to reduced absorption or enhanced secretion.

5955 HISTOCHEMICAL AND ELECTRON MICROSCOPIC OBSERVATIONS ON THE DEVELOPMENT, NEURAL CONTROL AND FUNCTION OF THE PANETH CELLS OF THE MOUSE.

(E.) Ahonen, A. (Dept. Anat., Univ. Helsinki, Finland). *Acta Physiol. Scand.* [*Suppl.*] 398:1-34, 1973.

5956 RAPID ENHANCEMENT OF CHICK INTESTINAL DNA-DEPENDENT RNA POLYMERASE II ACTIVITY BY 1α,25-DIHYDROXYVITAMIN D_3 IN VIVO.

(E.) Zerwekh, J. E.; Haussler, M. R.; Lindell, T. J. (Coll. Med., Univ. Arizona, Tucson). *Proc. Natl. Acad. Sci. USA* 71(6):2337-2341, 1974.

5957 STUDIES ON THE PASSAGE OF α-CHYMOTRYPSIN ACROSS THE INTESTINE. II. ENZYMIC ACTIVITY AND RADIOACTIVE MACROMOLECULE RECOVERED IN THE MESENTERIC PERFUSATE.

(E.) Moriwaki, C.; Yamaguchi, K.; Moriya, H. (Sci. Univ. Tokyo, Japan). *Chem. Pharm. Bull. (Tokyo)* 22(5):1029-1034, 1974.

See also, 5764, 5782, 5783, 5789, 5793, 5796, 5808, 5817, 5870, 5963, 5965, 5975.

GENERAL

5958 EFFECT OF VARIOUS PARENTERAL NUTRITIONAL SOLUTIONS ON HEPATIC BLOOD FLOW IN DOGS.

(E.) Hallberg, D.; Soda, M. (Karolinska Inst., Stockholm, Sweden). *Acta Chir. Scand.* 140(3):226-231, 1974.

Different solutions for parenteral nutrition were studied for their effect on hepatic blood in adult mongrel dogs of both sexes. Hepatic blood flow was measured by electromagnetic flow meters on the hepatic artery and the portal vein. Each solution was injected i.v. into a peripheral vein at a constant rate of 0.64-1.14 ml/kg/min for a total volume of 100 ml. No significant effects were observed for blood, Ringer solution, or fat emulsion (20% Intralipid). A significant increase in hepatic blood flow was observed for hypertonic solutions (5.5% glucose, 28%; 10% fructose, 38%; and 15% glucose, 55%). However, amino acid solutions produced the most pronounced rise: Vamin 135%, Intramin 64%, and Aminosol 60%. (Vamin contains 70 g/liter of 18 amino acids; Intramin 66 g/liter of 11 amino acids; and Aminosol 100 g/liter of 18 amino acids but at greater concentrations than Vamin.) The i.v. administration of hypertonic solutions seems to induce vasodilation of the splanchnic vascular bed as well as a decrease in vascular resistance. It is suggested that hyperosmolality could inhibit contractile activity of vascular smooth muscle cells and cause dilation of resistance vessels. Although the infusion rate was high in this study, the fact that the amino acid mixtures showed a more marked increase in pressure and in flow than did other solutions with a comparable osmolality raises the possibility that one or several of the various amino acids have some specific effect on hepatic blood flow. In addition, previous observations that plasma glucagon increases during hyperaminoacidemia suggest a possible hormonal cause of effect on hepatic blood flow. The metabolic physiology of amino acids in giving rise to changes in the blood levels of glucagon and insulin and in influencing the distribution of hepatic blood flow requires further study.

5959 IMMUNE-MEDIATED EMIGRATION OF NEUTROPHILS INTO THE LUMEN OF THE SMALL INTESTINE. *(E.)* Bellamy, J. E. C.; Nielsen, N. O. (Western Coll. Vet. Med., Univ. Saskatchewan, Saskatoon, Canada). *Infect. Immun.* 9(4):615-619, 1974.

Pigs were actively immunized to bovine serum albumin (BSA) by 3 s.c. inoculations of 140 mg BSA. After 4-hr exposure of intestinal mucosa to BSA (525 mg/10-cm ligated loop), immunized animals showed a 20- to 30-fold increase in the numbers of neutrophils entering the intestinal lumen when compared with nonimmune controls. This response was specific for the immunizing antigen and could be transferred to nonimmune animals with immune serum. The emigration of neutrophils through the intestinal mucosa was not accompanied by edema, hemorrhage, and thrombosis which were apparent after intradermal inoculation of BSA into the same animals. The intestinal mucosa showed no evidence of neutrophil emigration or any other abnormal features 24 hr after mucosal exposure to BSA. These observations suggest that emigration of neutrophils into the intestinal lumen can be a specific, antibody-mediated immune response which occurs in the absence of intestinal injury. By determining, in part, neutrophil loss from the body through this mechanism, enteral antigens of all types may be involved in the regulation of neutrophil production. The integrated action of specifically attracted neutrophils acting as phagocytes and specific antibodies acting as opsonins could be a factor in the elimination or control of specific microorganisms or harmful macromolecules in the intestinal lumen. It is also possible that large numbers of neutrophils, attracted by a specific antigen, disintegrate within the intestinal lumen, releasing intracellular enzymes and antibacterial substances that inactivate or destroy the offending antigen.

5960 PREDOMINANT GRAM-POSITIVE BACTERIA IN HUMAN FECES: NUMBERS, VARIETY, AND PERSISTENCE. *(E.)* Gossling, J.; Slack, J. M. (West Virginia Univ. Med. Ctr., Morgantown). *Inject. Immun.* 9(41):719-729, 1974.

The predominant gram-positive bacteria in 47 fecal specimens from 10 healthy men (aged 20-40 yr) were studied by microscopic and cultural counts, by characterization and tentative identification of isolates, and by use of fluorescein isothiocyanate (FITC)-conjugated globulins prepared from some of the isolated bacteria. The number of gram-positive bacteria averaged $10^{10.5}$/g (wet weight) of feces with significant variation from host to host. Characterization of 865 isolates, all strict anaerobes and carbohydrate fermenters, showed 12-39 distinguishable strains from each host and indicated that some strains were present for a period of about 18 months. Of the isolates, 60% belonged to 1 of 5 types, tentatively identified as the following species: *Bifidobacterium adolescentis*, *Eubacterium aerofaciens*, *E. rectale*, *Peptostreptococcus productus*, and *Ruminococcus bromii*. There was a distinct host idiosyncrasy in the pattern of estimated counts of these 5 types. Certain strains resembling *B. adolescentis*, *E. aerofaciens*, and *P. productus*, distinguished with FITC conjugates, were present in their hosts for more than 18 months. In direct smears each strain constituted about 1% of the total bacteria. It is suggested that gram-positive bacteria cannot be considered as a metabolic unit in studying colonic ecology.

5961 REGIONAL CIRCULATORY ADJUSTMENTS TO EATING AND DIGESTION IN CONSCIOUS UNRESTRAINED PRIMATES. *(E.)* Vatner, S. F.; Patrick, T. A.; Higgins, C. B.; Franklin, D. (Harvard Med. Sch., Boston, Mass.). *J. Appl. Physiol.* 36(5):524-529, 1974.

Responses to feeding were investigated in 8 baboons and 1 chimpanzee. Measurements of mesenteric, iliac, renal, and coronary blood flows and arterial pressure were radiotelemetered from the conscious, unrestrained animals continuously at rest during eating, and postprandially until all measurements returned to preprandial control levels. The response to feeding was biphasic. Presentation and ingestion of food by the baboons increased mean arterial pressure (24 mmHg), heart rate (64 beats/min), and mesenteric and renal resistances while coronary and iliac resistances fell. As these effects subsided, a gradual and sustained mesenteric vasodilation occurred. By 50 min postprandially mesenteric flow increased from 212 to a maximum of 372 ml/min, while mesenteric resistance fell from 0.52 to 0.29 mmHg•min/ml. At this time iliac flow decreased by 33 ml/min from 105 ml/min and iliac resistance rose from 0.93 to 1.36 mmHg•min/ml, while arterial pressure, heart rate, renal and coronary flows and resistances were essentially at preprandial control levels. Atropine (0.4 mg/kg. i.m.) attenuated the mesenteric vasodilation postprandially. Postprandial mesenteric vasodilation in the chimpanzee occurred later and was considerably prolonged in duration. This study supports the hypothesis that postprandial angina pectoris is due to an increase in myocardial oxygen demands caused by the elevations in pressure, heart rate, and myocardial contractility that occur with ingestion. Extrapolating these results to patients with diseased coronary vessels, it is suggested that postprandial angina pectoris is due to the inability of diseased coronary vessels to provide added blood flow for the increased metabolic demand on the heart.

5962 ASSESSMENT OF BOWEL VIABILITY USING TECHNETIUM-TAGGED ALBUMIN MICROSPHERES.

(E.) Moossa, A. R.; Skinner, D. B.; Stark, V.; Hoffer, P. (Univ. Chicago Hosp. Clin., Ill.) *J. Surg. Res.* 16(5):466-472, 1974.

Laparotomy was performed in 24 dogs and in 18 rhesus monkeys. In each case, a loop of jejunum (10 dogs and 2 monkeys) or the splenic flexure of the colon (4 dogs and 14 monkeys) was mobilized. The length of small bowel rendered ischemic varied from 6-15 cm while the segment of colon varied from 5-7.5 cm in length. The intramural collateral blood supply was completely interrupted. After ischemic periods varying from about 1/2 to 9 hr, the vascular occlusion was released. Three min later, 1-3 mCi of ^{99M} Technitium-labeled albumin microspheres 15-30 μm in diameter were injected into the upper abdominal aorta *via* the retrograde catheter. Macroscopic assessment of bowel viability proved unreliable in 12 of 18 monkeys and in 15 of 26 dogs. All 18 animals with large-bowel ischemia passed blood and mucus per rectum about 12-48 hr afterward, with the amount of bleeding most pronounced in those animals with marked hyperemic response. Only 5 of the 24 animals with small-bowel ischemia developed frank rectal bleeding. After 3-5 days postoperatively, 13 animals died from bowel perforation and gangrene. All of these had no hyperemic response over the injured segment and both junctional zones. Localized perforation with abcess formation, internal fistula, and partial obstruction occurred in 18 animals. All showed hyperemia over only 1 of the 3 areas. Strictures with varying degrees of large or small bowel obstruction developed in 5 animals. They all had hyperemic response over 2 of the 3 areas. Those 16 animals with normal bowel and minimal adhesions 7-8 weeks postoperatively demonstrated marked hyperemia over all 3 areas. These studies show that (1) rectal bleeding in ischemic colitis occurs mainly during the hyperemic phase; (2) strictures or gangrene can develop as the reactive hyperemia diminishes; and (3) the likelihood of gangrene or stricture developing increases with duration of vascular occlusion. ^{99M} Technitium albumin microspheres may help avoid unnecessary or excessive bowel resection in conditions such as strangulated hernias, mesenteric vascular occlusion, ischemic colitis, and volvulus neonatum.

5963 EFFECTS OF OUABAIN ON INTESTINAL OXYGEN CONSUMPTION.

(E.) Pawlik, W.; Shepherd, A. P.; Mailman, D.; Jacobson, E. D. (Univ. Texas Med. Sch., Houston). *Gastroenterology* 67(1):100-106, 1974.

Most patients with fatal hemorrhagic necrosis of the gut are administered a cardiac glycoside at the onset of their illness. Previously, it was found that the rapid-acting cardiac glycoside, ouabain, constricted intestinal arterioles and reduced mesenteric blood flow. Since tissue necrosis presumes hypoxia as well as ischemia, the effect of ouabain on intestinal oxygen consumption was determined. Two *in situ* canine preparations were used: (1) an isolated loop of gut was autoperfused at constant blood flow, and perfusion pressure was measured across the loop; and (2) a segment of gut with uninterrupted circulation was used, and its blood flow was measured with an electromagnetic blood flow meter. An oxygen difference analyzer continuously measured oxygen content in arterial and venous blood photometrically in both preparations. Ouabain (5 μg/min for 10 min) decreased oxygen consumption and increased mesenteric vascular resistance in the constant-flow preparation, exhibiting a more marked effect on oxygen uptake. The glycoside also reduced oxygen consumption and blood flow in the free-flow preparation. Since a reduced oxygen consumption could result from either decreased capillary perfusion or decreased metabolism, ^{86}Rb clearance which is an index of capillary perfusion, was measured; ^{86}Rb is not metabolized. The clearance of ^{86}Rb was decreased by ouabain. These findings indicate that ouabain not only decreases intestinal blood flow but also decreases intestinal oxygen consumption, probably by constricting precapillary sphincters.

5964 THE ROLE OF THE INTRAMURAL CHOLINERGIC INNERVATION IN THE ACID RESPONSE OF THE PARIETAL CELL TO GASTRIN DERIVATIVES.

(E.) Davison, J. S.; Fahrner, P. C.; Schofield, B.; Tepperman, B. L. (Dept. Physiol., Univ., Dundee, Scotland). *Can. J. Physiol. Pharmacol.* 52(3):469-482, 1974.

The action of nerve-blocking agents on gastric secretion in fundic pouches in dogs was investigated. Histamine (4-12 μg/kg s.c., every 15 min) was used as a direct acid stimulant and was compared with gastrin and derivatives whose action may involve local nerves. In most cases, the inhibitor agent was applied to an established plateau of secretion but in some series, lidocaine (0.083 M) was allowed to act for 1/2 hr before stimulation was commenced. In Heidenhain pouches, atropine (5-20 μg/kg i.v.) produced a mean inhibition of submaximal pentagastrin and gastrin plateaus of -88%. Hexamethonium (1 mg/kg i.v.) was without effect on the pentagastrin response, indicating that only the terminal element of the cholinergic pathway can be involved in gastrin stimulation of the parietal cell. Blockage of this terminal link was demonstrated in Pavlov pouches under insulin stimulation (0.05-1.0 U/kg i.v.), the mean inhibition being -95%. Pepsin secretion was also abolished. Lidocaine was without effect on established histamine plateaus in Heidenhain pouches, and the same result was observed with stimulation by gastrin (0.01 μg/kg/min) and its derivatives. This last result, implying no nervous involvement in the gastrin effect, led to reexamination of insulin experiments where lidocaine was applied before acid secretion. Experiments with lidocaine on established insulin responses gave an inhibition of only -44%. Thus pentagastrin experiments with pretreatment were carried out but the mean inhibition was only -15%, as compared with the mean inhibition of -95% in the lidocaine-pretreatment insulin series. To exclude nonspecific effects of lidocaine, sodium net flux studies were performed. There was a small increase in positive Na$^+$ net flux in the vagal stimulation in which the acid response is virtually abolished. In pentagastrin experiments with lidocaine pretreatment, larger positive net sodium fluxes occurred though acid secretion was not significantly reduced. Therefore, the powerful inhibition in the vagal stimulation experiments is not related to nonspecific effects. It is concluded that the acid secretory response of the parietal cell to gastrin derivatives does not involve excitation of intramural cholinergic nerve elements. However, the response of the parietal cell to gastrin acting directly may be potentiated by acetylcholine release from resting fibers. Until this possibility is excluded, the blocking effects of atropine cannot be regarded as nonspecific.

5965 STUDIES ON THE PASSAGE OF α-CHYMOTRYPSIN ACROSS THE INTESTINE. II. ENZYMIC ACTIVITY AND RADIOACTIVE MACROMOLECULE RECOVERED IN THE MESENTERIC PERFUSATE.

(E.) Moriwaki, C.; Yamaguchi, K.; Moriya, H. (Fac. Pharm. Sci., Sci. Univ. Tokyo, Japan). *Chem. Pharm. Bull.* 22(5):1029-1034, 1974.

Perfusion with Krebs-Ringer solution containing dextran through the mesenteric vascular system was performed on male Wistar rats which had received ^{131}I-labeled α-chymotrypsin in the jejunum. This technique eliminated various blood components, such as the inhibitors of enzymes, which interfere with quantitative assay of small amounts of absorbed enzymes. Under these conditions, non-diffusible ^{131}I-bound substance (s) and N-acetyl-L-tyrosine ethyl ester-hydrolyzing activity were found in mesenteric perfusates. The amount of enzyme absorbed during 90 min was about 0.6% of the infused dose. When mesenteric perfusate was reacted with antiserum against α-chymotrypsin, a precipitin band was formed with perfusate collected during the first 30 min after the administration. These results indicate that a small but significant portion of α-chymotrypsin administered in the intestine can be transmitted into the mesenteric vein without losing its enzymatic and immunochemical properties.

5966 EXTRAVASCULAR CIRCULATION OF ALBUMIN IN EXPERIMENTAL INTESTINAL OBSTRUCTION.

(E.) Herczeg, B. (Semmelweis Med. Univ., Budapest, Hungary). *Z. Exp. Chir. (Jena)* 6(5):337-345, 1973.

To investigate the mechanism of protein loss from the plasma during intestinal obstruction, blood and lymph were analyzed for labeled human albumin before surgery and 5 days after i.v. administration (100 μCi) of ^{131}I-albumin into 7 male and female ileum-ligated dogs. Inhibition of iodine uptake by the thyroid was accomplished through administration of Lugol solution, and the animals were thyroidectomized 6 hr after injection of the labeled albumin. Seven other dogs served as controls. Lymph protein levels were measured as an indirect reflection of protein in the interstitial fluid. Disappearance of labeled albumin from the blood did not differ in the 2 groups. Statistically, the difference between lymph protein levels in ileus and controls was at the borderline of significance in the thoracic duct, but there was decreased protein in the intestinal lymph trunk of obstructed dogs. In ileus, the quantity of transported protein/unit time was decreased; and in both lymphatic trunks, increase in radioactivity was slower and total lymph flow declined compared with controls. In addition, no significant edema was seen in parenchymatous organs, small intestine, or muscles of animals with ileus. These results do not support the theory that increased plasma leakage into the interstitium might explain the great protein loss from the plasma observed during intestinal obstruction.

5967 HEPATIC BLOOD FLOW AND PORTAL VEIN PRESSURE DURING INTRAVENOUS INFUSION OF AMINO ACIDS IN DOGS.

(E.) Hallberg, D.; Soda, M. (Karolinska Inst., Stockholm, Sweden). *Acta Chir. Scand.* 140(3): 232-233, 1974.

The blood flow in the portal vein and the hepatic artery was studied in 10 adult mongrel dogs of both sexes during constant i.v. infusion of different doses (0.1-1.2 ml/kg/min) of an amino acid mixture (Vamin) containing 10% fructose. Systemic arterial and portal vein blood pressures were also recorded. No effect on systemic pressure was observed, but the portal pressure increased significantly even at the lowest studied dose of 0.1 ml/kg/min. At the highest dose, the portal pressure had increased 100%. Hepatic artery and portal vein blood flow also rose, even at small doses, but the increases were significantly more pronounced in the portal vein (e.g., 100% with highest dose) than in the hepatic artery. Results indicate a significant dose-response relation between the rate of solution infusion and both hepatic blood flow and portal blood pressure. Although the doses given were usually pharmacologically high, rates up to 0.2 ml/kg/min may have some clinical applications. Since previous studies showed that amino acid mixtures without fructose influenced portal pressure and flow more than 10% fructose alone, it is possible that the main findings in this study are related to the effect of the amino acids on the splanchnic blood vessels. The effect may be a vasodilation of the capillaries in the intestinal mucosa, similar to that observed after an oral meal of proteins.

5968 EFFECT OF OXYGEN BREATHING ON JEJUNAL TISSUE GAS TENSIONS DURING SUPERIOR MESENTERIC ARTERIAL OCCLUSION.

(E.) Inberg, M. V.; Havia, T.; Arola, M. K.; Niinikoski, J. (Dept. Surg., Univ. Turku, Finland). *Scand. J. Gastroenterol.* 9(4):337-342, 1974.

The effects of superior mesenteric arterial occlusion on jejunal tissue gas tensions in dogs ventilated continuously with air or 100% oxygen were measured by means of an implanted Silastic tube. One dog was used primarily to test the method. The remaining 6 dogs were handled in pairs so that jejunal tissue gas tensions were obtained simultaneously from air-breathing and oxygen-breathing animals. Ventilation of each pair of animals with pure oxygen significantly increased the supply of oxygen in the jejunal wall during superior mesenteric arterial occlusion. It is suggested that this is due to marked collateral circulation of the bowel. During superior mesenteric arterial occlusion the jejunal tissue pCO_2 was consistently higher in oxygen-breathing dogs than in air breathing dogs. This indicates that during the ischemic period the ability of jejunal tissue to produce carbon dioxide is better preserved in animals breathing oxygen. These results tend to support earlier observations that oxygen therapy delays the effects of superior mesenteric arterial occlusion on the intestine.

5969 BLOOD FLOW DURING OBSTRUCTION TO THE VENOUS EFFECT OF PORTACAVAL TRANSPOSITION ON HEPATIC OUTFLOW FROM THE CANINE LIVER.

(E.) Baker, P. R.; Shields, R. (Dept. Surg., Univ. Liverpool, England). *Ann. Surg.* 180(1):89-94, 1974.

A useful model of advanced hepatic lesion for the assessment of portacaval transposition is described, with measurement of hepatic blood flow in dogs having different degrees of outflow block in the liver after such transposition. Complete block of hepatic venous outflow in 5 dogs with portacaval transposition resulted in a steady decline of estimated hepatic blood flow. Four weeks later, mean flow was only 46% of the value obtained 3 days after surgery; however, such reduced flow did not prevent the development of ascites which occurs in dogs with complete hepatic venous outflow block alone. In the longest surviving dog, complete reversal of portal flow was present. When portacaval transposition was performed in 5 dogs with established partial outflow block, estimated hepatic blood flow remained at preoperative levels whether portal hypertension was present or not prior to the second operation. This maintenance of hepatic blood flow was due to continuing venous flow into the portal bed. In a 3rd group of 19 animals with complete hepatic venous outflow block only, the early death of dogs and the development of gastroduodenal ulcers was unexpected since there were no obvious causes of death although the degree of liver damage was extensive when assessed histologically and biochemically. In general, the results indicate that portacaval transposition would probably be of little benefit in cases of advanced cirrhosis since the potential advantage of this procedure, the maintenance of venous inflow to the liver, is not realized. Where the hemodynamic derangement of the liver is less severe, portacaval transposition may be preferable to portacaval shunt in some cases.

5970 PATHOPHYSIOLOGY OF SALMONELLA DIARRHEA IN THE RHESUS MONKEY: INTESTINAL TRANSPORT, MORPHOLOGICAL AND BACTERIOLOGICAL STUDIES.

(E.) Rout, W. R.; Formal, S. B.; Dammin, G. J.; Giannella, R. A. (Walter Reed Army Inst. Res., Washington, D.C.). *Gastroenterology* 67(1):59-70, 1974.

In vivo jejunal, ileal, and colonic water and electrolyte transport were studied in *Salmonella typhimurium*-infected male rhesus (*Macacca mulatta*) monkeys, and alterations in transport were correlated with changes in intestinal morphology and with intraluminal *Salmonella* concentrations. In controls, net water absorption was seen in the jejunum, ileum, and colon. All *Salmonella*-infected monkeys with diarrhea had severe colitis associated with either a marked inhibition of colonic water absorption or net colonic secretion. Monkeys with mild diarrhea had mildly impaired ileal and markedly impaired jejunal transport; in contrast, monkeys with severe watery diarrhea demonstrated net secretion in the jejunum, ileum, and colon. Sodium and chloride transport paralleled water transport in magnitude and direction. In the ileum, the severity of morphological damage and the intraluminal *Salmonella* concentrations correlated with the degree of transport abnormalities and with the severity of the observed diarrhea. However, despite a transport defect in the jejunum, bacterial invasion was never seen and morphological changes were minimal, as were intraluminal *Salmonella* concentrations. These observations suggest that in *Salmonella*-infected monkeys, mild diarrhea may result from the inability of the colon to reabsorb the fluid load presented to it by the small intestine, but severe diarrhea may result from profound transport abnormalities in both the jejunum and ileum superimposed on those in the colon. Unlike enterotoxin-mediated diarrheas, *Salmonella* diarrhea seems to involve both the small and large intestine, and is regularly accompanied by both ileitis and colitis. Whether the abnormalities observed in this study are also similar to those occurring in man is not known and must await human perfusion studies.

5971 THE INFLUENCE OF VENOUS PRESSURE ON FILTRATION FORCES IN THE INTESTINE.

(E.) Johnson, P. C.; Richardson, D. R. (Univ. Arizona Coll. Med., Tucson). *Microvasc. Res.* 7(3):296-306, 1974.

The effect of venous pressure on capillary and tissue hydrostatic and oncotic (colloid osmotic) pressures was studied in the dog intestine. Tissue hydrostatic pressure was measured beneath the serosal surface of the intestine with a fine needle which was inserted while viewing the area under a dissecting microscope. The needle pressure remained essentially at zero when venous pressure was elevated in a stepwise fashion from 0 to 20 mm Hg. In another experiment, the protein concentration of intestinal lymph was measured and used to calculate the lymph oncotic pressure. When venous pressure was elevated from 0 to 25 mm Hg, lymph protein levels fell from 5.1% to 0.8%. Plasma protein levels remained at approximately 6.2% during the experiment. The fall in lymph oncotic pressure with increasing venous pressure was quantitatively identical to the rise in capillary pressure. If it is assumed that lymph oncotic pressure variations quantitatively reflect changes occurring in the interstitium, these results indicate that adjustments in tissue fluid oncotic pressure are important in limiting blood-tissue fluid exchange. The changes in tissue oncotic pressure offer an explanation for the fact that the intestine becomes isogravimetric over a sizable range of venous pressures.

5972 ESTIMATION OF HEPATIC AND PORTAL BLOOD FLOWS BY AN INDICATOR DILUTION TECHNIQUE. *(E.)* Huet, M. D. (McGill Univ., Canada). *Diss. Abs. Int.* [*B*] 35(1):466, 1974.

5973 EFFECT OF B_6 DEFICIENCY OF HEPATOMA 7794A GROWTH RATE: ACTIVITIES OF TYROSINE TRANSAMINASE AND SERINE DEHYDRATASE BEFORE AND AFTER INDUCTION BY HYDROCORTISONE. *(E.)* Tryfiates, G. P.; Shuler, J. K.; Hefner, M. H.; Morris, H. P. (West Virginia Univ. Med. Ctr., Morgantown). *Eur. J. Cancer* 10(3):147-154, 1974.

5974 THE FECAL FLORA OF MAN. PART II. THE COMPOSITION OF BIFIDOBACTERIUM FLORA OF DIFFERENT AGE GROUPS. *(Ger.)* Mitsuoka, T.; Hayakawa, K.; Kimura, N. (Inst. Phys. Chem. Res., Wako-Shi, Japan). *Zentralbl. Bakteriol.* [*Orig. A*] 226(4):469-478, 1974.

5975 DEVELOPMENT OF ENTERIC PARASITES IN PARENTERALLY FED RATS. *(E.)* Castro, G. A.; Johnson, L. R.; Copeland, E. M.; Dudrick, S. J. (Univ. Texas Med. Sch., Houston). *Proc. Soc. Exp. Biol. Med.* 146(3):703-706, 1974.

5976 SUBCELLULAR IONIC DISTRIBUTION IN LIVER AND HEART TISSUES OF COLD-ACCLIMATED RATS. *(E.)* Bramante, P. O.; Nirdlinger, E. L. (Univ. Illinois Coll. Med., Chicago). *Proc. Soc. Exp. Biol. Med.* 146(3):776-780, 1974.

5977 3-C-HYDROXYMETHYL-D-RIBURONIC ACID SYNTHESIS OF THE BRANCHED-CHAIN URONIC ACID AND COMPARISON WITH A CARBOHYDRATE COMPONENT OF A NATURALLY OCCURRING BILIRUBIN CONJUGATE. *(E.)* Blackstock, W. P.; Kuenzle, C. C.; Eugster, C. H. (Inst. Org. Chem., Univ. Zurich, Switzerland). *Helv. Chim. Acta* 57(4):1003-1009, 1974.

5978 ON THE EXISTENCE OF A MONO-VINYL *D*-UROBILIN. *(E.)* Chedekel, M.; Bovey, F. A.; Brewster, A. I. R.; Petryka, Z. J.; Weimer, M.; Watson, C. J.; Moscowitz, A.; Lightner, D. A. (Dept. Chem., Iowa State Univ., Ames). *Proc. Natl. Acad Sci. USA* 71(5):1599-1601, 1974.

5979 NUCLEAR MAGNETIC RESONANCE AS A NEW TOOL IN CANCER RESEARCH: HUMAN TUMORS BY NMR. *(E.)* Damadian, R.; Zaner, K.; Hor, D.; DiMaio, T.; Minkoff, L.; Goldsmith, M. (Dept. Med., State Univ. New York, Brooklyn). *Ann. NY Acad. Sci.* 222:1048-1076, 1973.

5980 EFFECTS OF AGE ON GROWTH AND FOOD EFFICIENCY RESPONSE IN RATS INFECTED WITH TAPEWORM LARVAE. *(E.)* Ruegamer, W. R.; Phares, C. K. (Univ. Nebraska Med. Ctr., Omaha). *Proc. Soc. Exp. Biol. Med.* 146(3):698-702, 1974.

5981 PERITONEAL EFFUSIONS AFTER HEPATOBILIARY SURGERY: CONTRIBUTION TO EXPERIMENTAL PRINCIPLES. *(Ger.)* von Haller, C. (Maingau Red Cross Hosp., Frankfurt/Main, Germany). *Z. Exp. Chir. (Jena)* 6(5):324-336, 1973.

5982 RAPID FORMATION OF CARCINOGENIC *N*-NITROSAMINES BY INTERACTION OF NITRITE WITH FUNGICIDES DERIVED FROM DITHIOCARBAMIC ACID IN VITRO UNDER SIMULATED GASTRIC CONDITIONS AND IN VIVO IN THE RAT STOMACH. *(E.)* Eisenbrand, G.; Ungerer, O.; Preussmann, R. (German Cancer Res. Ctr., Heidelberg). *Food Cosmet. Toxicol.* 12(2):229-232, 1974.

5983 METHIONINE SUBSTITUTES IN RUMINANT NUTRITION I: STABILITY OF NITROGENOUS COMPOUNDS RELATED TO METHIONINE DURING IN VITRO INCUBATION WITH RUMEN MICROORGANISMS. *(E.)* Digenis, G. A.; Amos, H. E.; Yang, K.; Mitchell, G. E.; Little, C. O.; Swintosky, J. V.; Parish, R. C.; Schelling, G. T.; Dietz, E. M.; Tucker, R. E. (Dept. Pharm. Chem., Univ. Kentucky, Lexington). *J. Pharm. Sci.* 63(5):745-751, 1974.

5984 METHIONINE SUBSTITUTES IN RUMINANT NUTRITION II: STABILITY OF NONNITROGENOUS COMPOUNDS RELATED TO METHIONINE DURING IN VITRO INCUBATION WITH RUMEN MICROORGANISMS. *(E.)* Digenis, G. A.; Amos, H. E.; Mitchell, G. E.; Swintosky, J. V.; Yang, K.; Schelling, G. T.; Parish, R. C. (Dept. Pharm. Chem., Univ. Kentucky, Lexington). *J. Pharm. Sci.* 63(5):751-754, 1974.

5985 SPECIES DIFFERENCES IN LIPID PEROXIDATION AND THEIR EFFECTS ON ETHYLMORPHINE N-DEMETHYLASE ACTIVITY IN LIVER MICROSOMES. *(E.)* Kamataki, T.; Kitagawa, H. (Dept. Biochem. Pharm., Fac. Pharmaceut. Sci., Univ. Chiba, Japan). *Biochem. Pharmacol.* 23(13):1915-1918, 1974.

5986 EFFECT OF PARENTERAL ADMINISTRATION OF NUTRIENTS ON GASTROINTESTINAL FUNCTION. *(Rus.)* Shlygin, G. K. (Inst. Nutr., Moscow, USSR). *Vopr. Pitan.* (3):19-28, 1974.

5987 GASTROINTESTINAL HORMONES AND THE REGULATION OF DIGESTION, ABSORPTION, AND UTILIZATION OF FOOD. *(Rus.)* Skala, I.; Masek, J. (Inst. Clin. Exp. Med., Prague, Czechoslovakia). *Vopr. Pitan.* (3):28-37, 1974.

5988 STUDY OF THE PROPERTIES OF PEPSINOGEN II AND CHICKEN PEPSINOGEN II. *(Rus.)* Riftina, F. D.; Lokshina, L. A.; Kalinkina, T. A.; Orekhovich, V. N. (Inst. Biol. Med. Chem., Moscow, USSR). *Biokhimiia* 39(3):641-647, 1974.

See also, 6262.

DIAGNOSTIC PROCEDURES

5989 ENDOSCOPIC RETROGRADE CHOLANGIOGRAPHY: METHOD OF CHOICE FOR DIAGNOSING CYSTS OF THE COMMON BILE DUCT. *(Ger.)* Nuesch, H. J.; Hahnloser, P.; Fumagalli, I.; Jenny, S.; Deyhle, P. (Cantonal Hosp., Zurich, Switzerland). *Dtsch. Med. Wochenschr.* 98(44):2069-2070, 1973.

Case reports are presented for 2 patients with choledochal cysts which were diagnosed preoperatively by endoscopic retrograde cholangiography. A 41-yr-old woman with a long history of fat intolerance developed symptoms of acute cholecystitis. An i.v. cholangiogram revealed a clover-leaf-shaped cavity in the descending biliary tract which could not be interpreted. Retrograde endoscopic cholangiography demonstrated a pear-shaped proximal dilation of the common bile duct. The cystic and hepatic ducts were also dilated, but the pancreatic duct and intrahepatic bile ducts were of normal size. Two stones were visualized in the gallbladder. The diagnosis of a choledochal cyst was confirmed at surgery, and the gallbladder did not contain 2 stones. A 41-yr-old woman who had undergone cholecystectomy for cholecystolithiasis and recurrent biliary colic 18 yr before developed pancreatitis. A cholecystogram showed marked dilation of the bile ducts, but the patient refused surgery. Endoscopic retrograde cholangiography, performed 2 yr later, showed a massively dilated common bile duct which contrasted with intrahepatic bile ducts of normal caliber; the pancreatic duct was normal. A diagnosis of a choledochal cyst was established and confirmed at surgery. In addition, a stone was found which was not visualized by retrograde cholangiography. Endoscopic retrograde cholangiography is recommended for preoperative diagnosis of choledochal cysts since they are difficult to diagnose from the history, clinical symptoms, and conventional radiological methods. Because any amount of contrast medium can be injected in the biliary tract, this technique can even demonstrate large cysts.

5990 A COMPARISON OF THE BROMSULPHTHALEIN AND GALACTOSE ELIMINATION TEST IN PATIENTS WITH EITHER CHRONIC BOWEL INFLAMMATION OR ALCOHOLIC LIVER DISEASE. *(E.)* Nilsson, L. H.; Hultman, E. (St. Erik's Hosp., Stockholm, Sweden). *Scand. J. Gastroenterol.* 9(3):319-323, 1974.

Simultaneously i.v. infused BSP (5 mg/kg) and galactose (350 mg/kg) were used as a test of liver function in 2 groups of patients over a period of 2 yr. One group consisted of 89 patients (37 men and 52 women, mean age 31 yr) hospitalized for chronic inflammatory bowel disease. The other group comprised 88 patients (78 men and 10 women, mean age 55 yr) with clinical signs of liver damage due to chronic alcohol abuse. In paitients with alcoholic cirrhosis, both substances showed a decreased elimination from the blood. Patients in the alcohol abuse group, with histologically verified steatosis of the liver but without reactive changes in the portal fields, were characterized by a prolonged galactose elimination time but a normal retention of BSP. A normal galactose elimination capacity was typical for the patients with chronic inflammatory bowel disease, whereas the BSP retention was increased in 47% of patients admitted to hospital. The data suggest that the excretory function of the liver is frequently disturbed in chronic inflammatory bowel disease, whereas the parenchymal metabolic function is preserved. This is in accordance with the most common type of liver damage in cases of ulcerative colitis or Crohn's disease.

5991 CORRELATION OF LIVER AND SPLEEN SIZE. DETERMINATIONS BY NUCLEAR MEDICINE STUDIES AND PHYSICAL EXAMINATION. *(E.)* Halpern, S.; Coel, M.; Ashburn, W.; Alazraki, N.; Littenberg, R.; Hurwitz, S.; Green, J. (Univ. California Sch. Med., La Jolla). *Arch. Intern. Med.* 134(1):123-124, 1974.

Since accurate knowledge of the liver and spleen size is often important in diagnosis, scintiphotography of these 2 organs was performed on 214 patients, and the results were correlated with those obtained by physical examination: palpation, percussion, patient positioning, and ballottement. In 113 (53%) patients, the liver was considered to be either enlarged or reduced in size by physical examination compared to 94 (44%) as determined by scintiphotography. Thus, there were 19 false-positive interpretations of liver size by physical methods. In only 29 (14%) patients was the spleen considered to be enlarged by physical examination whereas splenic enlargement was indicated in 92 (43%) patients by scintiphotography, a total of 63 false-negative interpretations by physical methods. Review of the patients' clinical charts showed a concurrence with scintiphotography findings in 141 (66%) patients as to liver size; clinical methods showed 148 (69%) patients with splenomegaly but scintiphotography revealed only 92 cases. However, of these 92, only 26 (28%) splenomegalies were recognized by physical examination. Although scintiphotography is not completely free of subjective interpretation (i.e., determining the size of a 3-dimensional organ by measuring any 2 dimensions), the liver and spleen scintiphotogram offer a relatively clear-cut assessment of the size of these organs, except in the truly borderline cases.

5992 SIMULTANEOUS ESOPHAGEAL AND BRONCHIAL ENDOSCOPY IN 1000 CASES OF ESOPHAGEAL CANCER. *(Fr.)* Chavy, A.; Liguory, C.; de Peyer, R.; Meduri, B.; Fauvet, J.; Lemoine, J. M. (Gustave Roussy Inst. Villejuif, France). *Ann. Gastroenterol. Hepatol. (Paris)* 9(4):319-326, 1973.

In a 12.5-yr. period, simultaneous endoscopic examinations of the esophagus and bronchi were performed on 1000 patients with esophageal cancer. Of these patients, 856 (85.6%) had epidermoid carcinomas and 144 (14.4%) had adenocarcinomas in the lower 1/4 of the esophagus. Histological confirmation of the diagnosis was made at endoscopy in 90.6% of these patients and at surgery or autopsy in the remaining 9.4%. Endoscopy was performed under local anesthesia and was generally well tolerated. Traumatic lesions of the esophagus occurred in only 8 cases (0.8%), and no bronchial complications developed. Tracheal or bronchial anomalies were present in 484 cases (48.4%). These consisted of extrinsic compression in 353 cases

(35.3%), infiltration in 68 (6.8%), and growths in 63 cases (6.3%). All of these anomalies occurred at a level in the bronchial tree corresponding to that of the esophageal tumor. Tracheobronchial lesions most often involved the posterior trachea or the principal left bronchus. The incidence of these anomalies was highest (65%) for tumors in the cervical esophagus, decreasing to 12% for tumors in the lower 1/4 of the esophagus. The finding of tracheobronchial lesions is not only a contraindication for surgical removal of the esophageal tumor, but also a contraindication for high-energy radiotherapy since irradiation of an esophageal tumor which has invaded the bronchial tree increases the risk of fistula formation.

5993 DIBROMSULPHALEIN (DBSP) ESTIMATION OF HEPATIC TRANSPORT FUNCTION IN MAN.

(E.) Dhumeaux, D.; Berthelot, P.; Javitt, N. B. (Henri Mondor Hosp., Creteil, France). *Eur. J. Clin. Invest.* 4(3):181-185, 1974.

BSP and disulfobromophthalein (di-BSP) were given separately in equimolar amounts by i.v. injection or infusion to 15 healthy individuals and 33 individuals with hepatobiliary disease. The patients included subjects with alcoholic cirrhosis (9), viral hepatitis (9), cholestasis due to extrahepatic obstruction (4), and Dubin-Johnson syndrome (2). The slope of the plasma disappearance rate, the relative storage capacity, and the maximum biliary excretion rate for both BSP and di-BSP were calculated. In the normal group the slope of the plasma disappearance rate, 0.234, was significantly greater than for BSP, 0.151, indicating a more rapid plasma disappearance for di-BSP. Similarly the relative storage capacity was significantly higher for di-BSP, 124.6 μmol/μmol/100 ml, than for BSP, 67.7. However, the maximum biliary excretion rate for di-BSP, 10.9 μmol/min, was not significantly different from that for BSP, 9.5. In the cirrhotic patients, there was reduction in these three parameters which was of the same order of magnitude for both dyes, indicating that di-BSP is as sensitive as BSP in the detection of liver disease. Since di-BSP is not conjugated *in vivo*, this suggests that the modifications of BSP disposition in cirrhosis are attributable primarily to a defect in the transport function of the liver cell. Defective conjugation of BSP therefore probably does not contribute significantly to the BSP abnormalities observed in cirrhotic patients. During prolonged infusion of BSP, especially in hepatobiliary disease patients, a large amount of BSP in plasma is actually conjugated. The presence of BSP conjugates in the plasma could theoretically contribute to reduce the BSP storage in these patients. Thus di-BSP, while distributed as a single compound, could provide a more accurate estimate of the relative storage capacity.

5994 RESULTS OF ENDOSCOPIC RETROGRADE CHOLANGIOGRAPHY IN DIAGNOSING SYMPTOMS DEVELOPING AFTER BILLARY SURGERY.

(Ger.) Safrany, L.; Barna, L.; Papp, J.; Tari, J. (1st Med. Clin., Semmelweis Univ., Budapest, Hungary). *Z. Gesamte Inn. Med.* 29(10):397-401, 1974.

In a 2-yr period, 238 endoscopic regrograde cholangiographies were performed using the Olympus JF-B duodenoscope and 60% Urographin (meglumine diatrizoate) as the contrast medium. Of these procedures, 148 (62%) were performed on patients who had undergone biliary surgery. Cholecystectomy was the most commonly performed operation, but 42 patients had undergone corrective surgery of various types, particularly enterobiliary anastomoses. Since these anastomoses are sometimes difficult to locate with an endoscope, indocyanine green was injected i.v. Diagnoses consisted of the following: normal biliary tract (36 cases), intrahepatic cholestasis (9), primary biliary cirrhosis (16), sclerosis of the sphincter of Oddi (14), stricture of the common bile duct (19), primary sclerosing cholangitis (2), cholecystolithiasis (2), choledocholithiasis (61), biliary carcinoma (13), carcinoma of the head of the pancreas (17), normal enterobiliary anastomosis (18), pathological changes in an enterobiliary anastomosis, (8), carcinoma of the papilla of Vater (3), and juxtapapillary diverticulum (13). The most common diagnoses in patients with recurrent biliary diseases were choledocholithiasis (33%), stricture of the common bile duct (12%), and hypertrophy of the sphincter of Oddi (8%). In juxtapapillary diverticulum, remnants of food which were present in the papilla produced ascending cholangitis, and dislocation and compression of the papilla or distal common bile duct resulted in cholestasis. Jaundice could develop either as a result of biliary obstruction or of secondary stone formation. In 1 patient recurrent stones were removed from the biliary tract 4 times since the diverticulum had not been diagnosed despite repeated surgery. Endoscopic retrograde cholangiography revealed well-defined organic changes in patients who had been referred with a diagnosis of cystic stump syndrome. It is doubtful that the cystic stump plays any pathogenetic role in postcholoecystectomy syndrome.

5995 THE DIAGNOSIS OF EARLY GASTRIC CANCER.

(E.) Elewaut, A.; Cardon, M.; Mortier, G.; Barbier, F. (Univ. Hosp., Ghent, Belgium). *Tijdschr. Gastroenterol.* 16(2):111-116, 1974.

A review was made of 1445 gastroscopic examinations performed during the period 1968-1971. For most examinations a gastrofiberscope with biopsy was used. A few examinations were performed with a fiber esophagoscope. Out of 154 cases of gastric carcinoma detected or confirmed by endoscopy, 7 cases of early carcinoma (0.48% of all examinations) were proven by histologic examination of the resected stomach. In only 2 cases was malignancy strongly suspected on radiological evidence. This is in contrast to the findings of Japanese authors who succeeded in diagnosing 80% of all cases radiologically using double contrast methods. In 3 of 6 biopsied cases, the diagnosis of carcinoma was confirmed by histologic examination. The 50% failure in obtaining the correct diagnosis by biopsy may be accounted for by the fact that only 2 biopsies were taken in each patient. Suspicion of malignancy was made in endoscopy alone in 5 cases with irregular dark red surface with little nodules, whitish coat, and alteration of the mucosal folds.

which suddenly break off serving as important signs. Early diagnosis of gastric carcinoma is essential since long-term survival depends on early surgery. It is stressed that endoscopic examination be made of every patient with persistent atypical epigastric complaints. Multiple biopsies must be taken at the margin and the base of the ulcer. It is noted that even a healed ulcer may be malignant.

5996 THE SIGNIFICANCE OF THE LIVER-SPLEEN UPTAKE RATIO IN LIVER SCANNING. *(E.)* Wilson, G. A.; Keyes, J.W. (Univ. Michigan Med. Ctr., Ann Arbor). *J. Nucl. Med.* 15(7):593-597, 1974.

In this study of rectilinear liver and spleen scans (posterior view with both organs visible) taken over a 3-yr period on 563 patients (1-88 yr), the relative uptake of ^{99m}technetium sulfur colloid was evaluated by a simple criterion. The method, involving categorization of the scans into groups showing equal or relatively greater uptake by spleen or liver, provided a useful diagnostic criterion with some differential diagnostic significance. Increased splenic uptake was seen in 290 patients (122 males and 168 females, average age 50.5 yr) and most commonly occurred in malignancy (48%), liver cirrhosis (13.4%), and diabetes mellitus (10.7%). No association with anemia was found. Increased uptake by the liver was seen in 58 patients (24 males and 34 females, average age 51.7 yr) and occurred most commonly in malignancies (59%), gastrointestinal disease other than liver (8.6%), and diabetes mellitus (7.0%). Equal uptake by liver and spleen was found in 215 patients (130 males and 85 females, average age 53 yr) and involved malignancy (51.2%), infection (8.4%), and collagen disease and arthritis (6.1%). In general, the presence of an unequal liver/spleen ratio of uptake suggested a chronic rather than an acute process.

5997 CLEARER ROENTGENOGRAPHIC VISUALIZATION OF THE COLON. A STUDY OF A CONVENIENTLY PACKAGED KIT FOR PREPARING THE COLON, AND ITS EFFECT ON ELECTROLYTE BALANCE. *(E.)* Irwin, G. A. L.; Shields, J. E.; Wolff, W. (Nassau County Med. Ctr., East Meadow, N. Y.). *Gastroenterology* 67(1):47-50, 1974.

The results of an investigator-blind controlled evaluation of coded films indicate that a newly available commercial kit is more effective in preparing patients for barium enema roentgenographic visualization of the colon than the standard castor oil and enema procedure. Of the 325 patients studied over an 8-month period, 245 (105 men and 140 women, mean age 57.2 yr) were treated with castor oil and 80 (34 men and 46 women, mean age 55.6 yr) were prepared by kit treatment consisting of a bowel evacuant of magnesium citrates, citric acid, and sodium citrate, followed by phenolphthalein tablets, and potassium bitartrate and sodium bicarbonate enemas. Kit patients also received large quantities of fluids. The kit preparation resulted in considerably improved barium enema studies, was more readily accepted by the patient and nursing staff, resulted in a smaller percentage of repeat examinations, and had no adverse effect on serum electrolytes (sodium, chloride, potassium, carbon dioxide, blood urea nitrogen, and glucose). Repeat studies were ordered in 55.5% of the castor oil group compared with 40% of kit-prepared patients, a statistically significant difference.

5998 RADIOLOGICAL FINDINGS IN RETROGRADE PANCREATOGRAPHY AND THEIR PATHOLOGIC ANATOMICAL SUBSTRATE. *(Ger.)* Nette, L.; Deyhle, X. (Central Inst. Radiol. Diagnosis, Zurich, Switzerland). *Radiol. Clin. Biol.* 43(4):328-333, 1974.

Radiological findings from retrograde pancreatography with Urografin are compared with autopsy findings in 4 patients with pancreatic disease. Radiography revealed duplication of the pancreatic duct with sharp but irregular contours in an alcoholic patient with no clinical evidence of pancreatic disease. Histological examination showed pancreatic fibrosis in which the lobules were constricted by connective tissue. Lipomatosis and pancreatitis with parenchymal necrosis were diagnosed at autopsy in a patient with no clinical or radiological evidence of pancreatitis. In a patient with a carcinoma of the papilla of Vater, radiological examination showed dilatation of the pancreatic duct and its lateral branches with obstruction of the common bile duct in addition to a small papillary tumor. Another patient with extensive metastases from a bronchial carcinoma had histological evidence of acute hemorrahagic necrotizing pancreatitis. In addition to a blurred pancreatic duct with irregular contours, retrograde pancreatography revealed spots of contrast medium emerging at sites where parenchymal necrosis was evident on gross examination.

5999 HUMAN LIVER MITOCHONDRIA. III. ATPase ACTIVITY AS AN INDEX OF MITOCHONDRIAL DAMAGE. *(E.)* Benga, G.; Muresan, L. (Med. Pharm. Inst. Cluj, Rumania). *Biochem. Med.* 10(2):131-145, 1974.

Liver mitochondria from patients with fatty liver, chronic hepatitis, cirrhosis, and obstructive jaundice and from normal subjects were analyzed for ATPase activity. $MgCl_2$ (5 mM), 2,6-diiodo-4-nitrophenol (DNP, 0.05-0.4 mM), and bovine serum albumin (1% final concentration) were added to reaction mixtures containing 5 mM ATP, 150 mM sucrose, 50-75 mM KCl, 50 mM Tris-HCl (pH 8.5), 0.5 mM edetic acid, and 0.1-0.2 mg mitochondrial protein. ATPase in normal mitochondria had a low basal activity, was slightly stimulated by Mg, and was greatly stimulated by DNP. The optimal DNP concentration for maximal stimulation varied with pH and was dependent on the presence of albumin in the incubation mixture. Basal and Mg-stimulated ATPase activity was low at neutral pH and increased at lower and higher pH values; DNP-ATPase activities were low at acid pH and showed a broad maximum in the alkaline pH range. In general, the shape of the pH curves depended on mitochondrial integrity. After aging (1 hr at 37 C), the curves showed a gradual disappearance of DNP-activated ATPase. In 1 patient with fatty liver and reversible mitochondrial damage, Mg-stimulated activity was greater than DNP-stimulated ATPase without albumin; in the presence of albumin, there was a reversal of the ratio DNP-ATPase/Mg-ATPase. In pathological conditions (liver and biliary diseases), irreversible damage occurred. This was characterized by high basal and Mg-ATPase values and little DNP stimulation even in the presence of albumin.

6000 SPECIFIC IMMUNODIAGNOSIS OF HEPATOCELLULAR CARCINOMA BY LEUCOCYTE ADHERENCE INHIBITION. *(E.)* Halliday, W. J.; Halliday, J. W.; Campbell, C. B.; Maluish, A. E.; Powell, L. W. (Dept. Microbiol., Univ. Queensland, Brisbane, Australia). *Br. Med. J.* 2(5915):349-352, 1974.

The leukocyte adherence inhibition test is simple to perform and requires no complex equipment or cultivation or labeling of tumor cells. This technique was used to study 7 cases of primary hepatic tumors, of whom 6 had hepatocellular carcinoma and 1 had hepatoblastoma; 3 cases of secondary hepatic tumors, 1 each of malignant melanoma, adenocarcinoma of the lung, and squamous cell carcinoma of the cervix uteri; 43 cases with other diseases of the liver of whom 33 were cirrhotic (9 alcoholic, 8 with chronic active hepatitis and 16 with hemochromatosis); and 4 with melanoma and adenocarcinomas of the breast, colon, and stomach. The test is based on the observation that when blood leukocytes from a cancer patient are mixed with the corresponding specific tumor antigen, the tendency of the leukocytes to adhere to glass is inhibited. Serum from such patients interferes with this inhibition. This technique gave consistently positive results in confirmed malignant hepatomas and enabled this malignancy to be distinguished from secondary hepatic tumors, nonmalignant liver disease, and other tumors not associated with the liver. Thus, leukocyte adherence inhibition provides a rapid, sensitive and specific test of value in diagnosis. In 2 patients, a positive result preceded the clinical appearance of hepatoma by 2 and 3 years, resp. In a further 4 patients with primary idiopathic hemochromatosis, blocking factor has been detected in the serum but as yet there is no other clinical or laboratory evidence of malignancy. It is suggested that cell-mediated immunity and serum blocking may be the earliest manifestations of malignant hepatoma in these patients.

6001 INTRAOPERATIVE DIAGNOSIS OF TUMOR-LIKE CHANGES IN THE HEAD OF THE PANCREAS BY FINE-NEEDLE ASPIRATION BIOPSY. *(Ger.)* Lederer, B.; Bodner, E. (Pathol. Inst., Univ. Innsbruck, Austria). *Dtsch. Med. Wochenschr.* 99(19):993-996, 1974.

Using a needle 5-8 cm long which has an external diameter of 0.6-0.8 mm, material was aspirated during surgery from the head of the pancreas of 54 patients (37 men and 17 women, aged 34-78 yr; mean age 60 yr). Up to 6 samples were taken from the area to be studied, and material was stained by a modification of the Papanicolau method. Of these 54 patients 33 had malignant tumors of the head of the pancreas, as confirmed by histological examination. No evidence of malignancy was found during follow-up examinations made 8 months or more after surgery in 21 patients with benign changes in the head of the pancreas. Fine-needle biopsy gave a correct diagnosis in 88% of these patients, and no false-positive results were obtained. In 2 cases a diagnosis could not be established because only blood and detritus were aspirated. Fine-needle biopsies appear to be best suited for the diagnosis of carcinomas of the head of the pancreas and distal common bile duct, but failed to diagnose 1 papillary carcinoma. Because of the difficulty of obtaining sufficient material, fine-needle biopsy was less useful in diagnosing metastases in the head of the pancreas. However, metastases from a fibrosarcoma and a small-cell bronchial carcinoma were correctly diagnosed with this technique. Cytological preparations show atypical nuclear changes more clearly than frozen sections obtained during surgery. While it is easy to make an accurate diagnosis of polymorphic adenocarcinomas and undifferentiated carcinomas with fine-needle biopsies some difficulty may be encountered in the differentiated carcinomas.

6002 SERUM α-FETOPROTEIN: DIAGNOSTIC SIGNIFICANCE IN LIVER DISEASE. *(E.)* Ruoslahti, E.; Salaspuro, M.; Pihko, H.; Andersson, L.; Seppala, M. (Dept. Serol. Bacteriol., Univ. Helsinki, Finland). *Br. Med. J.* 2(5918):527-529, 1974.

Raised serum α-fetoprotein levels (>25 ng/ml) measured by radioimmunoassay were found in 19 of 24 (79%) patients with primary liver cancer and in 32 of 311 (10%) patients with other liver diseases. The rise was transient in cases of hepatitis and a transient rise was also seen after alcohol intake ceased in 2 patients with cirrhosis. α-Fetoprotein levels exceeding 500 ng/ml were 30-50 times more common in primary liver cancer than in other liver diseases. A rise in level seems to reflect the extent of liver regeneration in liver diseases other than primary cancer. More extensive studies will be needed to establish the consistency and possible diagnostic significance of a correlation between the extent of the regenerative response and the α-fetoprotein level in man.

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6007 FREQUENCY OF VISUALIZATION OF THE NORMAL APPENDIX WITH THE BARIUM ENEMA EXAMINATION.

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6011 SIXTEEN MULTIPLE GASTRODUODENAL ULCERS: DIAGNOSTIC VALUE OF FIBROSCOPY. *(Fr.)* Choukroun; Monod-Broca, P.; Testas (Bicetre Hosp., Paris, France). *Chirurgie* 99(8):540-546, 1973.

6012 THE DIAGNOSTIC VALUE OF PANCREATIC SCANNING FOR TUMORS OF THE PANCREAS. (ANATOMOSCINTIGRAPHIC STUDIES). *(Rum.)* Gheorghescu, B.; Jovin, G.; Suseanu, I.; Anghel, E.; Boicascu, L.; Runcan, V. (Ctr. Gastroenterol., Bucharest, Rumania). *Med. Interna (Bucur.)* 25(11):1353-1362, 1973.

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6042 CONTRAST ENHANCEMENT OF THE MESENTERIC AND PORTAL VEINS USING INTRA-ARTERIAL PAPAVERINE. *(E.)* Widrich, W. C.; Nordahl, D. L.; Robbins, A. H. (VA Hosp., Boston, Mass.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(2):374-379, 1974.

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Garrido, M. (Fac. Med., Cadiz, Spain). *Rev. Esp. Enferm. Apar. Dig.* 42(6):709-714, 1974.

6047 IMMUNOFLUORESCENCE CAUSED BY AUSTRALIA ANTIGEN: ITS LIMITS AND SIGNIFICANCE. *(It.)* Nenci, I.; Fabris, G.; Beccati, D. (Inst. Pathol. Anat. Histol., Univ. Ferrara, Italy). *Riv. Patol. Clin. Sper.* 13(1/2):1-20, 1972-1973.

6048 DIAGNOSTIC TECHNIQUES IN GASTROINTESTINAL CANCER. *(E.)* Sherlock, P.; Winawer, S. J. (no affil.). *Clin. Bull. (New York)* 3(4):127-133, 1973.

6049 THE PERIHEPATIC HALO IN LIVER SCINTIGRAPHIC PERFUSION STUDIES: A SIGN OF ASCITES. *(E.)* Alter, A. J.; Farrer, P. A. (Roy. Victoria Hosp., Montreal, Canada). *J. Nucl. Med.* 15(6):396-398, 1974.

See also, 5943, 6086, 6088, 6089, 6151, 6153, 6162, 6221, 6228, 6232, 6234, 6253, 6254, 6283, 6338, 6416, 6417, 6418, 6421, 6429, 6458, 6459, 6463, 6470.

GASTROINTESTINAL DISEASES

ESOPHAGUS

6050 MEASUREMENT OF GASTRO-OESOPHAGEAL ACID REFLUX: ITS SIGNIFICANCE IN HIATUS HERNIA. *(E.)* Lichter, I. (Univ. Otago Med. Sch., Dunedin, New Zealand). *Br. J. Surg.* 61(4):253-258, 1974.

Gastroesophageal reflux may be responsible for the development and symptoms of esophageal damage. Demonstration of reflux by radiography or by conventional pH studies is not, however, always correlated with disability. This unpredictability may be accounted for by the observation that during the day refluxed material is rapidly cleared from the esophagus by swallowing, while during sleep little swallowing occurs. To explore the hypothesis that reflux during sleep is the important factor, prolonged intraesophageal pH studies were carried out and a method was developed for quantifying nocturnal gastroesophageal reflux. The investigation showed that persistence of acid within the esophagus is associated with prolonged periods during sleep when no swallowing occurs. Measurements of nocturnal intraesophageal pH were made in 41 patients with symptomatic sliding hiatus hernia. In 12 patients with mild symptoms, the duration of reflux measured by this index did not exceed 15 min, with 1 exception, and no patient had esophagitis. In 10 patients with moderate symptoms, reflux did not exceed 1 hr, with 1 exception, and mild to moderate esophagitis was present in 4 cases. Nineteen patients had severe symptoms; in all but 1 the period of reflux was in excess of 1 hr, and esophagitis was found in 13. The results suggest that it is patients in whom the esophagus is bathed in reflux fluid for long periods during sleep who suffer symptoms or who are at risk from future complications of reflux.

6051 ENDOSCOPY OF THE ESOPHAGUS IN SCLERODERMA. REPORT OF 20 CASES. *(Fr.)* Petite, J. P.; Chaput, J. C.; Gueroult, J. N.; Guerre, J.; Housset, E. (Broussais Hosp., Paris, France). *Ann. Gastroenterol. Hepatol.* 9(4):311-318, 1973.

Endoscopic examinations of the esophagus were performed on 26 patients (21 women and 5 men, aged 39-68 yr; mean age 56 yr) with clinical symptoms of scleroderma. The most common symptoms were Raynaud's phenomenon (26 cases), sclerodactylia (25 cases), telangiectasia (18 cases), and ulceration or amputation of the fingers (16 cases); only 3 patients had multiple visceral involvement. In 20 patients no peristaltic contractions were observed in the lower 2/3 of the esophagus, and water remained in the esophagus for more than 30 sec after instillation of a few ml into the lower esophagus while the patient was lying down. Gastroesophageal reflux or a permanently open cardia was found in 12 patients and was associated with a small hiatus hernia in 4. Peptic esophagitis was present in 7 cases, and peptic stenosis of the lower esophagus in 3. Only 9 patients had clinical symptoms referable to the esophagus: dysphagia was present in 7, and 6 had a syndrome compatible with gastroesophageal reflux. Radiological examinations of the esophagus, performed on 25 patients, revealed disturbances in esophageal motor activity (19 cases), gastroesophageal reflux (10), hiatus hernia (3), and peptic stenosis (3). No radiological abnormalities were found in 6 patients. Excellent agreement between radiological and endoscopic findings was obtained for esophageal motor activity and peptic stenosis, but peptic esophagitis was diagnosed only by endoscopy. Although esophageal lesions were more severe among patients with visceral involvement (2 of 3 had peptic esophagitis), outline searches for disturbances in esophageal motility in patients with Raynaud's phenomenon would facilitate early diagnosis of scleroderma.

6052 TWO CASES OF ESOPHAGEAL LEIOMYOMA IN ONE FAMILY. *(Rus.)* Tkachenko, G. K.; Rozhkova, A. P.; Korzhikova, E. V. (Alma-Ata Inst. Postgrad. Med., USSR). *Vopr. Onkol.* 20(5):81-83, 1974.

6053 ADENOCARCINOMA INVOLVING THE ESOPHAGUS. *(E.)* Hankins, J. R.; Cole, F. N.; Attar, S.; Frost, J. L.; McLaughlin, J. S. (Univ. Maryland Sch. Med., Baltimore). *J. Thorac. Cardiovasc. Surg.* 68(1):148-158, 1974.

6054 ACQUIRED PARAESOPHAGEAL AND DISPARAESOPHAGEAL HERNIAS. COMPLICATIONS OF HIATAL HERNIA REPAIR. *(E.)* Hoyt, T.; Kyaw, M. M. (Univ. Utah Med. Ctr., Salt Lake City). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(2):248-251, 1974.

6055 ENHANCED VISUALIZATION OF ESOPHAGEAL VARICES BY BUSCOPAN. *(E.)* Liu, C. I. (Natl. Defense Med. Ctr., Taipei, Taiwan). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(2):232-235, 1974.

6056 ANGIOGRAPHY IN THE DIAGNOSIS AND TREATMENT OF NONVARICEAL BLEEDING IN PATIENTS WITH PORTAL HYPERTENSION. *(E.)* Ring, E. J.; Baum, S.; Athanasoulis, C.; Waltman, A. C. (Harvard Med. Sch., Boston, Mass.). *Surg. Gynecol. Obstet.* 139(2):205-207, 1974.

6057 ALKALINE REFLUX ESOPHAGITIS. *(E.)* Wickbom, G.; Bushkin, F. L.; Woodward, E. R. (Coll. Med., Univ. Florida, Gainesville). *Surg. Gynecol. Obstet.* 139(2):267-271, 1974.

6058 RECENT ADVANCES IN DIAGNOSIS OF THE ESOPHAGEAL CANCER. *(Jap.)* Shinohara, S. (Sch. Med., Kagoshima Univ., Japan). *Jap. J. Cancer Clin.* 19(11):1046-1061, 1973.

ESOPHAGUS

6059 POSTOPERATIVE RADIOTHERAPY FOR CANCER OF THE ESOPHAGUS. *(Jap.)* Okamoto, Y.; Obitsu, R.; Kawashima, O.; Masasuka, H.; Tanaka, T.; Yasukochi, H.; Machida, K. (Tokyo Univ. Branch Hosp., Japan). *Jap. J. Cancer Clin.* 19(11):1096-1102, 1973.

6060 ADENOGENOUS ESOPHAGEAL CARCINOMAS. *(Rus.)* Kusakina, G. K.; Kolycheva, N. I. (Kazakh Sci. Res. Inst. Oncol. Radiol., Alma-Ata, USSR). *Vopr. Onkol.* 20(5):15-20, 1974.

6061 DYSKINESIA BENEATH ESOPHAGEAL DIVERTICULA: THERAPEUTIC INCIDENTS. *(Fr.)* Viard, H.; Favre, J. P.; Briet, S.; David, M. (Fac. Med., Dijon, France). *Chirurgie* 99(8):512-518, 1973.

6062 TREATMENT OF CICATRICIAL STRICTURES OF THE ESOPHAGUS BY DILATATION WITH RADIOPAQUE BOUGIES WHILE MONITORING THE RADIOLOGICAL PICTURE ON A TELEVISION SCREEN. *(Rus.)* Vantsian, E. N.; Chernousov, A. F.; Oganesian, M. A.; Anufriev, A. M. (I. M. Sechenov 1st Moscow Med. Inst., USSR). *Khirurgiia (Mosk.)* (8):110-114, 1973.

6063 SOME RESULTS FROM STUDYING AN ARTIFICIAL ESOPHAGUS MADE FROM THE GREATER CURVATURE OF THE STOMACH. *(Rus.)* Skobelkin, O. K.; Toshchakov, R. A.; Brekhov, E. I. (no affil.). *Khirurgiia (Mosk.)* (10):81-84, 1973.

6064 ONE CASE OF CAUSTIC ESOPHAGITIS PERFORATING INTO THE PERICARDIUM. *(Fr.)* Hivet, M.; Desvignes, P.; Coloigner, M.; Bigot, R.; Poilleux, J. (St. Antoine Hosp., Paris, France). *Ann. Chir.* 27(9):971-975, 1973.

6065 LATE FUNCTIONAL AND ORGANIC DISTURBANCES AFTER COLOESOPHAGOPLASTY. *(E.)* Stan, A.; Krisar, Z.; Raskai, A.; Savulescu, I.; Kanyady, T. (Hosp. No. 1, Oradea, Rumania). *Abdom. Surg.* 16(5):123-132, 1974.

6066 MULTIPLE LEIOMYOMAS OF THE ESOPHAGUS. *(E.)* Haber, K.; Winfield, A. C. (Univ. Arizona Med. Ctr., Tucson). *Am. J. Dig. Dis.* 19(7):678-680, 1974.

6067 ESOPHAGEAL INVOLVEMENT IN FAMILIAL BENIGN CHRONIC PEMPHIGUS. *(E.)* Kahn, D.; Hutchinson, E. (Coll. Human Med., Michigan State Univ., East Lansing). *Arch. Dermatol.* 109(5):718-719, 1974.

6068 A SAFER METHOD OF DILATING ESOPHAGEAL STRICTURES. *(E.)* Price, J. D.; Stanciu, C.; Bennett, J. R. (Hull Roy. Infirm., Kingston upon Hull, England). *Lancet* (7867):1141-1143, 1974.

6069 FIVE YEAR FOLLOWUP OF COLONIC TRANSPLANTS IN PATIENTS WITH EPIDERMOLYSIS BULLOSA PRODUCING ESOPHAGEAL OBSTRUCTION. *(E.)* De Leon, R.; Mispireta, L. A.; Absolon, K. B. (no affil.). *Med. Ann. D.C.* 43(5):241-244, 1973.

See also, 5992, 6035, 6056, 6087, 6089, 6099, 6310, 6472.

STOMACH

6070 THE ROLE OF MUCOSAL BLOOD FLOW IN THE PATHOGENESIS OF STRESS ULCERS. *(E.)* Schellerer, W. (Surg. Clin. Polyclin., Univ. Erlangen, Germany). *Acta Hepatogastroenterol* 21(2):138-141, 1974.

Local pO_2-tension was studied as an indicator of perfusion in dogs and male SPF-Wistar rats. In 10 dogs without hypoxia and with normal circulatory behavior, the blood flow in the splenic artery was correlated with the local pO_2-tension in the area of the gastric mucosa supplied by the artery. There was a positive correlation between reduced blood flow, resulting from the narrowing of the splenic artery, and the measured oxygen tension in the tissues. In restrained control rats, focal mucosal necrosis and defects of different depths were apparent within 24 hr of restraining stress. pO_2 was lower in stressed animals and the degree of the lesion was positively correlated with the reduced pO_2. Adrenalectomy alone resulted in a lower pO_2 and in similar focal mucosal lesions; additional immobilization produced greater changes. Stressed sham-operated rats showed the same changes as stressed controls.

6071 DETERMINATION OF THE INDIVIDUAL SENSITIVITY OF STOMACH CARCINOMAS TO 5-FLUOROURACIL FROM PARAMETERS OF RESPIRATION AND GLYCOLYSIS. *(Rus.)* Gnatyshak, A. I.; Shiian, D. N. (L'vov Med. Inst., USSR). *Vrach. Delo* (5):108-111, 1974.

Freshly prepared sections from 76 gastric carcinomas were incubated in the Warburg apparatus with and without 5-fluorouracil (12.5 mg/ml medium), and the rate of respiration was measured at 37 C and pH 7.4 for 2 hr. After treatment with 7% trichloroacetic acid, Ryan's technique was used to determine the concentration of lactic acid in 1 ml of medium. On the basis of these results, tumors were classified into 3 categories: (1) sensitive to 5-fluorouracil (respiration and glycolysis decreased by 60% or more, 20 tumors), (2) slightly sensitive (respiration and, in most cases, glycolysis decreased by 40-59%, 22 tumors), and (3) resistant (decreased respiration and, in some cases, glycolysis by less than 40%, 34 tumors). Sensitive tumors consisted primarily of adenocarcinomas (14 of 20), 3 scirrhous carcinomas, and no colloid carcinomas. Of the 34 resistant tumors, 12 were adenocarcinomas, 14 were scirrhous carcinomas, and 7 were colloid carcinomas. Diffuse and infiltrating carcinomas were more resistant to 5-fluorouracil than tumors with limited forms of growth. The sensitivity of the primary tumor was not appreciably affected by development of regional lymph node metastases or by its site. Tumors staged at T2 were more sensitive to 5-fluorouracil than those staged as T3. Follow-up studies made after 2 yr in 49 patients who had been given 5-fluorouracil revealed a correlation between the results of the *in vitro* study and the outcome of chemotherapy *in vivo*.

6072 LATE HYPOGLYCEMIA IN PATIENTS FOLLOWING VAGOTOMY AND PYLOROPLASTY. *(E.)* Wiznitzer, T.; Shapira, N.; Stadler, J.; Ayalon, D.; Harrell, A. (Ichilov Hosp., Tel-Aviv, Israel). *Surg.* 59(4):229-232, 1974.

Variations in plasma insulin and blood glucose levels after p.o. administration of 150 cc of 50% glucose (75 g) were studied in 24 patients following vagotomy and pyloroplasty for duodenal ulcer and in 10 normal control subjects. Following a test meal, 17 patients developed marked hypoglycemia which was asymptomatic in 11. The highest and lowest insulin and glucose levels differed significantly from those found in the controls. Individual glucose and insulin levels showed a close and constant relation and no significant difference between groups was found in the insulinogenic index. These results indicate that under a maximal stimulus, such as the test meal administered, patients are prone to develop hypoglycemia following vagotomy and pyloroplasty in the same way as they do after partial gastrectomy.

6073 HISTOAUTORADIOGRAPHIC APPROACH TO GASTROINTESTINAL TUMORS. I. STUDY OF A GASTRIC LEIOMYOMA WITH $^{35}SO_4$ AND ^{35}S-CYSTEINE. *(Fr.)* Cornet, A.; Bescol-Liversac, J.; Leperchey, F. (Laennec Hosp., Paris, France). *Sem. Hop. Paris* 49(13):911-914, 1973.

On the basis of histological and autoradiographic studies, tissue in a leiomyoma was classified into 3 different types. In the autoradiographic study, tumor fragments were incubated in oxygenated physiological saline containing $Na_2{}^{35}SO_4$ (50 μCi/ml) or ^{35}S-cysteine (5 μCi/ml) for 2 hr at 37 C. Ordinary adult smooth muscle tissue (type 1) incorporated only moderate amounts of $^{35}SO_4$ and ^{35}S-cysteine. Histologically, type (2) was characterized by tissue resembling embryonic smooth muscle tissue or schwannomas. Cells had few myofibrils and less acidophilic sarcoplasm than those belonging to type (1). Interstitial spaces surrounding these differentiating cells contained large amounts of acid mucopolysaccharide which incorporated large amounts of $^{35}SO_4$ and very little ^{35}S-cysteine. Type (3) tissue contained very thick fibers resembling certain smooth muscle fibers in invertebrates or in the wall of the human ureter. These fibers were provided with myofibrils arranged in bundles. Type (3) tissue incorporated little $^{35}SO_4$, but the sarcoplasm incorporated ^{35}S-cysteine rapidly. It is concluded that morphological variations observed in leiomyomas may correspond to different stages in the histogenesis of smooth muscle tissue.

6074 INTESTINAL IMMUNOGLOBULINS IN PRENICIOUS ANEMIA. *(E.)* Soltoft, J. (Gentofte Univ. Hosp., Copenhagen, Denmark). *Am. J. Dig. Dis.* 19(7):623-625, 1974.

Immunohistochemical investigation of gastric, jejunal, and rectal mucosal biopsies and the quantitation of immunoglobulin in jejunal juice and saliva were carried out in 8 patients (50-82 yr) with pernicious anemia, 4 under treatment with vitamin B_{12}, and 2 with additional diabetes mellitus. A slight increase of the jejunal IgG-containing cells and a decrease of IgA cells were the only abnormal findings outside the stomach, which showed grossly abnormal biopsies with a marked increase of IgG cells and a slight decrease of IgA cells. In addition, there was increased content of all immunoglobulins in the interstitial tissue. The data suggest that in pernicious anemia, no defect in the secretory immune system in mucosa remote from the stomach is present.

6075 RADIOLOGICAL EXAMINATION OF THE STOMACH AND DUODENUM AFTER PYLOROPLASTY. *(Fr.)* Lallemand, D. (St. Vincent de Paul Hosp., Paris, France). *Ann. Gastroenterol. Hepatol. (Paris)* 9(5):467-476, 1973.

An analysis was made of more than 100 radiocinematographic examinations of the upper gastrointestinal tract in patients who had undergone Heinecke-Mikulicz pyloroplasty and total or selective vagotomy. Although normal morphological features varied greatly from one patient to another, the pylorus had usually disappeared due to telescoping of the antrum and duodenum, and 2 recesses or symmetrical pseudodiverticula appeared in the lesser curvature and greater curvature, resp. Barium swallow examinations revealed gastric and duodenal stasis, which was evident in about 3/4 of these patients during the first month after surgery and gradually disappeared. Stasis was rare after the first year and was never associated with any organic obstruction. Radiologically detected sequelae included postoperative stenosis above the pyloroplasty which was associated, in 1 case, with a recurrent gastric ulcer; recurrent gastric and duodenal ulcers; and gastrointestinal dyskinesia. None of these patients developed gastric cancer after pyloroplasty. In some cases radiological evidence of dyskinesia was associated with clinical symptoms, but too few patients were studied to establish a cause and effect relationship. However, corrective surgery had to be performed on 1/2 of the patients who showed barium retention at the site of the pyloroplasty, between the antrum and duodenum. At surgery, the vagotomy was found to be incomplete or the area between the antrum and duodenum was too narrow. The absence of a duodenal blocking zone was another radiological finding occasionally associated with postoperative sequelae. In these cases barium passed rapidly from the stomach into the small intestine under the force of gravity, without the occurrence of gastric or duodenal contractions. True gastric antiperistalsis, which has previously been reported only in dogs, was observed for the first time in man in 3 of these patients.

6076 PSEUDOLYMPHOMATOUS GASTRITIS (PSEUDOLYMPHOMA OF THE STOMACH): ANATOMICAL AND RADIOLOGICAL CORRELATIONS. *(Fr.)* Meagher-Villemure, K.; Gareau, R.; Levesque, H. P. (Hotel Dieu, Montreal Canada). *Union Med. Can.* 103(4):717-721, 1974.

A 43-yr-old man had a 1-yr history of frequent vomiting of food and bile after meals and had lost 45 pounds in 3 months. Although gastroscopy showed neoplastic-like infiltration in the lesser curvature, a biopsy revealed only chronic inflammation of the gastric mucosa. Mucography showed definite thickening of the mucosa due to infiltration. Infiltrates caused contraction of the lesser curvature, made it rigid, and obliterated the angular fold. The mucosa was raised in some places and multiple superficial ulcerations measuring 3-10 mm in diameter were also detected. Examination of material removed at partial gastrectomy revealed a lesion measuring 8.5 x 7.5 cm which was devoid of folds and showed severe congestion along its periphery. In addition to peripheral erosions and ulcers, histological examination demonstrated signs of progressive gastritis associated with submucosal sclerosis. This is the 9th case of pseudolymphomatous gastritis diagnosed at 1 hospital in a 12-yr-period. These 9 patients consisted of 4 men and 5 women, aged 42-66 yr (mean 58 yr). Patients had clinical symptoms for 2 months to 8 yr before surgery. Gastroscopic diagnoses consisted of malignancies (4 cases), gastritis (3 cases), and benign ulcer (1 case).

6077 MECHANISM OF STRESS ULCER. III. EFFECTS OF HEMORRHAGIC SHOCK ON ENERGY METABOLISM IN THE MUCOSA OF THE ANTRUM, CORPUS, AND FUNDUS OF THE RABBIT STOMACH. *(E.)* Menguy, R.; Masters, Y. F. (Univ. Rochester Sch. Med., Den., N.Y.). *Gastroenterology* 66(6):1168-1176, 1974.

Since only the gastric fundus and corpus exhibit stress ulceration associated with blood loss, this study measured the energy deficit in the gastric mucosa of the antrum as compared to the fundus and corpus. Hemorrhagic shock was induced in male albino rabbits by either a single bleed or controlled hypotension method so that arterial blood pressure reached a mean level of 30 mm Hg. ATP levels and levels of ATP + ADP + AMP were significantly higher in the corpus mucosa than in the antrum and fundus of 11 controls which were not bled. In the single bleed condition the antrum mucosa had less decrease in ATP levels and less increase in AMP levels than in the corpus and fundus mucosa after 15 min of hypotension. One hr after the induction of shock, appreciable recovery in energy metabolism in the mucosa coincident with improvement in hemodynamic conditions was evident. With controlled hypotension, there was a much more rapid dephosphorylation of adenine nucleotides in corpus and fundus than in the antrum. Quantitatively, the changes were more severe than after a single bleed: greater drop in ATP + ADP and AMP, particularly in the corpus and fundus, and lower levels of ADP and AMP. Analysis of other substrates showed pyruvate levels lower and lactate rates higher in parietal cell mucosa (corpus and fundus) than in the antrum. The data here indicate that during severe hemorrhagic hypotension, antral mucosal tissue can sustain its energy metabolism at appreciably higher levels than the mucosa of the proximal regions of the stomach. The breakdown of adenosine phosphates in the corpus and the fundus was accompanied by an increase in glycolytic flux greater than that taking place in the antral mucosa. In the antrum, a slowly appearing energy deficit was accompanied by a slow glycolytic flux.

6078 GASTRIC INHIBITORY POLYPEPTIDE. RESPONSE TO ORAL GLUCOSE AFTER VAGOTOMY AND PYLOROPLASTY. *(E.)* Thomford, N. R.; Sirinek, K. R.; Crockett, S. E.; Mazzaferri, E. L.; Cataland, S. (Ohio State Univ. Hosp., Columbus). *Arch. Surg.* 109 (2):177-182, 1974.

Gastric inhibitory polypeptide, immunoreactive insulin, and glucose levels in response to glucose p.o. were determined in 10 patients with vagotomy and pyloroplasty and in 21 normal subjects. The truncal patients had the expected early and exaggerated increase in mean serum glucose with a subsequent decline to a level below fasting. The early mean gastric inhibitory polypeptide response was similarly elevated and paralleled the glucose response. The early mean serum immunoreactive insulin of the patients was greater than that of normal subjects, but only at 30 min was the difference statistically significant. Since gastric inhibitory polypeptide is known to be insulinotropic, the results of this study suggest that its role in the enteroinsular axis is magnified after vagotomy and pyloroplasty. The gastric inhibitory polypeptide may be in part responsible for the postprandial hypoglycemia recognized clinically as the late phase of the dumping syndrome.

6079 COLLECTION OF CHOLECYSTOGRAPHIC CONTRAST MATERIAL IN A LARGE ULCERATING LEIOMYOMA OF THE STOMACH. *(E.)* Perrin, R. L.; Boehnke, M. (Montefiore Hosp., Pittsburgh, Pa.). *Gastroenterology* 66 (4):601-603, 1974.

A 64-year-old man was hospitalized with a history of left lower leg thrombophlebitis and enlarging varicose veins. His hematocrit was 25.2%. There was no history of previous peptic ulcer disease and no symptoms of gastrointestinal discomfort or tarry stools. Guaiac positive stools were noted on digital rectal examinations. After two oral cholecystograms, a faint opacification of the gallbladder with a large amorphous collection of residual cholecystographic contrast material (ipodate) in the left upper abdominal quadrant was revealed. An upper gastrointestinal series showed a large ulcer crater with a broad-based, sharply defined, patent neck on the posterior wall of the body of the stomach. A prominent soft tissue mass surrounded the ulcer crater. Pathologic examination revealed a large subserosal and intramural leiomyoma ulcerating the gastric mucosa. The lack of mitotic activity seemed to indicate a benign rather than malignant tumor. The amorphous collection of contrast material in this case was most likely due to the persistent recumbent position at bedrest which allowed the contrast material to enter the leiomyoma. The material then became entrapped because of the lack of ambulation after the oral ingestion of the cholecystographic tablets.

6080 INTERMITTENT BASAL GASTRIC HYPERSECRETION FOLLOWING SMALL BOWEL RESECTION. *(E.)* Klein, M. S.; Winawer, S. J. (Memorial Sloan-Kettering Cancer Ctr., New York). *Am. J. Gastroenterol.* 61(6):470-475, 1974.

6081 GASTRIC CARCINOMA IN UGANDA. *(E.)* Bijlsma, F. (Dept. Pathol., Makerere Univ., Kampala, Uganda). *Trop. Geogr. Med.* 26(1):1-8, 1974.

6082 CARCINOMA OF THE STOMACH. AN ANALYSIS OF 385 CASES TREATED 1955 TO 1964. *(E.)* Nielsen, S. A. D.; Amdrup, E.; Christiansen, P.; Fenger, C.; Jensen, H. E.; Lindskov, J.; Nielsen, J. (Munic. Hosp., Copenhagen, Denmark). *Acta Chir. Scand.* 140(4):313-320, 1974.

6083 MICROBIAL FLORA OF STOMACH AND SMALL INTESTINE IN INFANTILE GASTROENTERITIS. *(E.)* Bishop, R. F.; Barnes, G. L.; Townley, R. R. W. (Royal Children's Hosp., Melbourne, Australia). *Acta Paediatr. Scand.* 63(3):418-422, 1974.

6084 COMBINED ENDOSCOPY IN UPPER GASTROINTESTINAL HAEMORRHAGE. *(E.)* Paull, A.; Van Deth, A. G.; Grant, A. K. (Queen Elizabeth Hosp., Adelaide, Australia). *Aust. NZ J. Med.* 4(1):12-15, 1974.

6085 EROSIVE GASTRITIS: A PRELIMINARY CLINICAL STUDY. *(E.)* Hunt, P.; Liberman, S. (Dept. Surg., Monash Univ., Melbourne, Australia). *Aust. NZ J. Surg.* 44(1):75, 1974.

6086 THE CLINICAL VALUE OF DETERMINATION OF HEXOKINASE, LACTATE DEHYDROGENASE AND ITS ISOENZYMES IN PATIENTS WITH GASTRIC CANCER. *(Rus.)* Podiljchak, E. M. (Med. Inst., Lvov, USSR). *Vopr. Onkol.* 20(5):23-28, 1974.

6087 FUNCTIONAL INVESTIGATIONS AFTER TOTAL GASTRECTOMY WITH ESOPHAGODUODENOSTOMY FOR THE TREATMENT OF CANCER. *(It.)* Stipa, V.; Bolognese, A.; Alessi, G.; Levi della Vida, A. (Inst. 1st Clin. Gen. Surg., Univ. Rome, Italy). *Chir. Gastroenterol.* 7(3):275-281, 1973.

6088 GASTRODUODENAL TUBERCULOSIS AS A RARE CAUSE OF PYLORIC STENOSIS. *(It.)* Picardi, N. (3rd Clin. Inst. Gen. Surg. Surg. Ther., Univ. Rome, Italy). *Chir. Gastroenterol.* 7(3):282-296, 1973.

6089 THE RESULTS OF 500 EXAMINATIONS MADE WITH A LO PRESTI ESOPHAGO-GASTROSCOPE. *(Sp.)* Yanes Lecuna, E.; Casalta, V.; Matos Villalobos, M. (Univ. Hosp., Caracas, Venezuela). *GEN* 27(3/4):243-254, 1973.

6090 CHEMOTHERAPY FOR INOPERABLE STOMACH CANCER. *(Rus.)* Koliadiuk, I. V.; Daniel'-Bek, K. V.; Vinogradov, A. L. (P. A. Gertsen Sci. Res. Inst. Oncol., Moscow, USSR). *Vopr. Onkol.* 20(5):72-77, 1974.

6091 GASTRECTOMY IN THE TREATMENT OF SEVERE GASTROINTESTINAL BLEEDING FROM PEPTIC ULCERS: SHORT- AND LONG-TERM RESULTS (115 CASES). *(Fr.)* Debesse, B.; Elhadad, A.; Cherkaoui, O.; Lakrissa, A.; Grenier, G.; Dumouchel, A.; Thomeret, G. (Laennec Hosp., Paris, France). *Ann. Chir.* 27(9):935-961, 1973.

6092 TREATMENT OF ACUTE DIFFUSE PERITONITIS CAUSED BY A PEPTIC ULCER: ITS SEQUELAE. *(Fr.)* Debesse, B.; Cherkaoui, O.; Reinmund, P.; Elhadad, A.; Thomeret, G. (Laennec Hosp., Paris, France). *Ann. Chir.* 27(9):963-969, 1973.

6093 GASTRIC LOCALIZATION OF ENDODERMAL SINUS TUMOUR. *(E.)* Moller, J. E.; Raahave, D. (Inst. Pathol. Anat., Univ. Copenhagen, Denmark). *Acta Pathol. Microbiol. Scand.* [A] 82(2):179-181, 1974.

6094 PRACTICAL VALUE OF GASTRIC ACIDITY DETERMINATION FOLLOWING PARTIAL GASTRECTOMY. *(Fr.)* Smadja, M. (St. Antoine Hosp., Paris, France). *Ann. Gastroenterol. Hepatol. (Paris)* 9(3):299-303, 1973.

6095 ALPHA FETOPROTEIN IN METASTATIC GASTRIC CARCINOMA. *(E.)* Kelleher, J.; Colum; Doyle, C.; Hennessy, T.; Whelton, M. J. (St. Finbarr's Hosp., Cork, Ireland). *Gut* 15(5):401-403, 1974.

6096 CANCER OF THE GASTROINTESTINAL TRACT. D. GASTRIC CANCER: TREATMENT PRINCIPLES. *(E.)* Rubin, P. (Univ. Rochester Med. Ctr., N.Y.). *J.A.M.A.* 228(10):1283-1286, 1974.

6097 REEVALUATION OF ENDOSCOPIC CLASSIFICATION OF EARLY GASTRIC CANCER, USEFULLNESS OF THE ORIGINAL CLASSIFICATION PATTERN COMBINED TYPES. *(Jap.)* Yasui, A.; Arakawa, M.; Tazaki, H.; Ichinose, Y.; Hirase, Y.; Miyake, M.; Ishibashi, C.; Yoshida,

M. (Dept. Surg., Juntendo Univ., Japan). *Jap. J. Cancer Clin.* 19(12):1151-1158, 1973.

6098 SURGICAL AND COMBINED TREATMENT OF GASTRIC CANCER. *(Rus.)* Kvashnin, Y. K.; Pokas, L. V.; Zelikovich, S. A.; Melentyeva, E. G. (Sci. Res. Inst. Roentgenol. Radiol., Moscow, USSR). *Khirurgiia (Mosk.)* (10):75-81, 1973.

6099 SURGICAL TREATMENT OF GASTRIC ADENOCARCINOMA. *(E.)* Menguy, R. (Univ. Rochester Med. Ctr., N. Y.). *J.A.M.A.* 228(10):1286-1287, 1974.

6100 CHEMOTHERAPY. *(E.)* Moertel, C. G. (no. affil.). *J.A.M.A.* 228(10):1290-1291, 1974.

6101 UPPER GASTROINTESTINAL FIBRE-OPTIC ENDOSCOPY. A 3-YEAR STUDY AT GROOTE SCHUUR HOSPITAL. *(E.)* Novis, B. H.; Bank, S.; Marks, I. N.; Clain, J. (S. Groote Schuur Hosp., Cape Town, South Africa). *S. Afr. Med. J.* 48(20):857-860, 1974.

6102 EPIDEMIOLOGICAL STUDY OF APPENDICITIS IN KHARTOUM. *(E.)* Osman, A. A. (Med. Sch., Univ. Khartoum, Sudan). *Int. Surg.* 59(4):218-221, 1974.

See also, 5838, 5845, 5982, 5995, 6008, 6017, 6019, 6034, 6036, 6063, 6108, 6114, 6143, 6146, 6168, 6187, 6430, 6438, 6439, 6462, 6472.

STOMACH

Peptic Ulcers

6103 PROSTAGLANDIN E IN PEPTIC ULCER DISEASE. *(E.)* Hinsdale, J. G.; Engel, J. J.; Wilson, D. E. (Dept. Med., Univ. Illinois, Chicago). *Prostaglandins* 6(6):495-500, 1974.

Prostaglandin E_1 and E_2 inhibit gastric secretion *in vivo* and *in vitro* under a variety of conditions, but it is not known whether these compounds play a role in normal gastric secretory physiology or in the pathophysiology of peptic ulcer. Six patients with documented duodenal ulcer and 6 normal adults were studied under basal conditions and during gastric secretory stimulation with i.m. betazole (1.5 mg/kg). Prostaglandin E in plasma and gastric juice was measured by radioimmunoassay. The prostaglandin E was significantly higher in the plasma of normal volunteers both in the basal state and during stimulation. Gastric juice prostaglandin E was also significantly higher in the controls during the basal state but the difference disappeared during stimulation. The relative deficiency of prostaglandin E in the ulcer group may indicate a role for prostaglandins in the pathophysiology of gastric hypersecretion.

6104 EFFECT OF INSULIN INJECTION ON SERUM GASTRIN CONCENTRATIONS IN DUODENAL ULCER PATIENTS AND NORMAL SUBJECTS. *(E.)* Stadil, F.; Rehfeld, J. F. (Rigshosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(2):143-147, 1974.

In 22 normal humans, the i.v. injection of 0.20 IU/kg insulin caused an increase in the serum concentrations of gastrin (from 26.7 ± 1.6 to 34.6 ± 3.9 pmol/liter) during gastric aspiration. The increase lasted for 1 hr. In 65 patients with duodenal ulceration, the gastrin concentrations increased from 30.1 ± 1.8 to 44.9 ± 3.0. The increase lasted for more than 1.5 hr. The response was significantly greater in the ulcer patients. Basal gastrin levels did not differ significantly between the two groups. In the normal subjects, gastric aspiration did not significantly change the basal gastrin concentrations; however, the insulin-induced increase in gastrin output was increased by aspiration, confirming the inhibitory action of low intragastric pH on the antral mucosa. The insulin-induced increase in gastrin output was also increased without aspiration, and the duration of the increase was not shortened. The data indicate that an intragastric pH of 1.0 to 1.5 does not abolish the gastrin response to insulin.

6105 PSYCHIATRY SERIES NO. 10: PERSONALITY AND DUODENAL ULCER. *(E.)* Apter, A.; Hurst, L. A. (Dept. Psychol. Med., Univ. Witwatersrand, Johannesburg, S. Africa). *S. Afr. Med. J.* 47(44):2131-2133, 1973.

Personality traits measured in 30 duodenal ulcer patients at a Johannesburg hospital were compared with those of 30 controls who had surgical conditions of comparable severity. The study was augmented by transcultural comparison of 50 male duodenal ulcer outpatients in Israel. There were no significant differences between the 2 groups of ulcer patients and controls in overall anxiety on the IPAT Anxiety Scale or in psychoticism, neuroticism, or extraversion as measured by the Maudsley Personality Inventory. Psychiatric histories obtained for Johannesburg ulcer patients suggested that pain may have decreased some basic drives. The results support recent views of psychosomatic illness as a reaction to stress, independent of static personality traits or specific emotional conflict.

6106 PEPTIC ULCER DISEASE IN THE TRANSPLANT RECIPIENT. *(E.)* Spanos, P. K.; Simmons, R. L.; Rattazzi, L. C.; Kjellstrand, C. M.; Buselmeier, T. J.; Najarian, J. S. (Dept. Surg., Univ. Minnesota, Minneapolis). *Arch. Surg.* 109(2):193-197, 1974.

Of 377 patients, 30 gave evidence of peptic ulcer prior to renal transplantation over a 5-yr period. Prophylactic vagotomy with pyloroplasty or antrectomy was performed on 19 of these patients prior to transplantation, and 14 of them were still well with transplants 7-61 months later; only 3 of these patients had posttransplant ulcer complications. No planned prophylactic operation was performed in 11 of the 30 peptic ulcer patients; 9 of these patients bled in the pre- or posttransplant period. Only 3 of 347 patients without pretransplant evidence of ulcer bled in the posttransplant period. None of the patients with vagotomy-antrectomy showed evidence of recurrent bleeding, but patients with active ulcer disease pretransplant sometimes had recurrences after vagotomy-pyloroplasty. These results indicate that pretransplant correction of the ulcerogenic tendency should be carried out and that antrectomy should be considered if active ulcers are present in the uremic transplant candidate.

6107 CIRCADIAN VARIATION OF PROSTAGLANDIN E (PGE) PRODUCTION IN HUMAN GASTRIC JUICE. *(E.)* Tonnesen, M. G.; Jubiz, W.; Moore, J. G.; Frailey, J. (Univ. Utah Coll. Med. Salt Lake City). *Am. J. Dig. Dis.* 19(7):644-648, 1974.

Prostaglandin E output in human gastric juice was determined by radioimmunoassay and correlated with gastric acid secretion in 10 normal subjects and 10 patients with duodenal ulcer. Prostaglandin E and acid outputs were higher in patients with peptic ulcer. Although not statistically significant, these changes were probably secondary to changes in gastric juice volume. A circadian rhythm of gastric Prostaglandin E production was observed in normal subjects with high output at midday, a spike at midnight, and low output in the early morning, in phase relationship to the circadian rhythm of gastric acid secretion. Disruption of Prostaglandin E and acid rhythms was found in ulcer patients. This study does not support the concept that prostaglandin deficiency may be an etiological factor in peptic ulcer disease. Nonetheless, a heretofore unrecognized disruption in gastric rhythm may prove to be of physiologic significance.

6108 CHANGES IN THE GASTRIN SECRETING "G" CELLS IN PEPTIC ULCER. *(It.)* Marzola, A.; Fabris, G.; Beltrami, C. A.; Nenci, I. (Inst. Pathol. Anat. Histol., Univ. Ferrara, Italy). *Riv. Patol. Clin. Sper.* 13(1/2):21-36, 1972-1973.

Quantitative evaluations of G cell populations and their ultrastructure were performed on material biopsied from the gastric antrum of 37 gastrectomized patients. These consisted of 12 patients with gastric ulcers, including 3 with healed ulcers; 10 with duodenal ulcers; 4 with primary adenocarcinomas in the lesser curvature; 1 with an anastomotic ulcer; and 10 with no evidence of peptic ulcer or gastric neoplasm. The number of G cells revealed by staining with hematoxylin-lead, was increased by a mean of about 35% in patients with recent uncomplicated gastric ulcers and was decreased by about 20% in those with duodenal ulcers. The decrease in G cells was pronounced in about half the patients with duodenal ulcers, while the results varied greatly in the other half. Because of the small number of patients examined, values obtained in patients with other diseases are not significant. However, the mean number of G cells was decreased by about 75% in patients with healed gastric ulcers and by about 38% in patients with gastric adenocarcinoma. The number of granulations, an indication of the gastrin content of the antral mucosa, correlated roughly with the number of cells per unit area, but values were high for uncomplicated gastric ulcer and low for duodenal ulcer. Electron microscope examinations with indirect immunofluorescence and hematoxylin-lead staining showed intense stimulation of gastrin production in gastric ulcer and gastrin storage in duodenal ulcer. The small number of G cells found in patients with healed gastric ulcers and gastric adenocarcinomas is attributed to severe antral gastritis and mucosal atrophy involving the endocrine cells.

6109 PREVENTION OF BILE REFLUX-INDUCED ACUTE GASTRIC ULCERATION IN THE RAT BY CHOLESTYRAMINE. *(E.)* Mersereau, W. A.; Hinshey, E. J. (Montreal Gen. Hosp., Canada). *Ann. Surg.* 179(6): 833-888, 1974.

The role of bile salts and refluxed duodenal content in the pathogenesis of acute gastric ulcers was examined in shocked Sprague-Dawley rats. Duodenal reflux was induced in duodenum-ligated animals by infusion of fluid through a catheter introduced just proximal to the ligation. For control animals, the duodenal contents were flushed into the stomach with 1 ml of tap water or placebo preparation. For experimental animals, 33 mg cholestyramine (Questran) was used in 1 ml of tap water. Fifteen minutes later, 5 ml of a 100 mEq/1 HCl solution were instilled into the stomach through the duodenal catheter and the animals were shocked by reducing the blood pressure to 20 mm Hg for 10 min by bleeding through a cannulated carotid artery. The shed blood was then reinfused, 0.1 ml colloidal carbon was infused into a right saphenous vein to mark tissue injury, and the animals were allowed to live 10 min longer before sacrifice. The stomachs were finally flushed and fixed with formalin. Following the duodenal reflux and shock, all of 8 control rats showed extensive ulceration as revealed by hemorrhage and accumulation of colloidal carbon in damaged vessels at the base of the ulcers. Of the 6 experimental rats, five showed inhibition of ulceration, the 6th showing only slight ulceration. Rats whose bile ducts were ligated 2 days before the reflux and shock procedures also failed to show extensive ulceration. These results suggested that the presence of bile salts in refluxed duodenal contents were responsible for breaking a normal barrier to ulceration. To further demonstrate barrier-breaking action in the stomach, *ex vivo* gastric chambers were prepared in rats, and experiments similar to the preceding *in vivo* tests were carried out except that bovine sodium taurocholate and sodium sulphate were used in place of refluxed duodenal contents. It was found that the ulcerative action due to these two barrier-breaking agents could be prevented by prior introduction of cholestyramine.

Cholestyramine also inhibited the usual rapid depression of the transmucosal potential difference (PD) produced by both of these agents. This PD was measured between the femoral vein and the chamber contents using catheters filled with 4% agar in saturated KCl. It was concluded that cholestyramine protects gastric mucosa from ulceration by blocking the barrier-breaking action of bile salts in duodenal chyme.

6110 FOLLOW-UP STUDY OF 100 PATIENTS WITH GIANT GASTRIC ULCER. *(E.)* Jensen, H. E.; Fenger, C.; Amdrup, E.; Christiansen, P.; Lindskov, J.; Nielsen, J.; Damgaard Nielsen, Sv. Aa. (Munic. Hosp., Copenhagen, Denmark). *Chir. Gastroenterol.* 7(4):397-405, 1973.

Clinical symptoms, complications, the incidence of malignancy, and mortality were investigated with regard to ulcer size in a consecutive series of 701 patients with stomach ulcers. Of these patients, 100 (14%) had ulcers judged from radiological and/or pathological examination to be larger than 3 cm in diameter and 601 patients had smaller ulcers. The sex ratio was similar in both groups, but there were significantly more patients less than 45 yr old among those with giant ulcers than among patients with smaller ulcers. The duration of symptoms was about the same in both groups. Although excessive weight loss (more than 10 kg in 6 months) was similar in both groups, 60% of patients with giant ulcers and only 45% of those with small ulcers lost weight. Patients with giant ulcers had more severe pain which often radiated, especially to the back, and this pain was less likely to be relieved by antacids or food. Although the bleeding frequency was similar in both groups, perforation, hemorrhagic shock, and radiological evidence of malignancy were significantly more frequent among patients with giant ulcers. The operative mortality was similar in both groups, but postoperative complications were more common among patients with giant ulcers. This was particularly true of anastomotic leakage, intraperitoneal abscess, pancreatitis, wound rupture, and persistent gastric retention. Over the follow-up period, which ranged from 5-15 yr (average 8 yr), 47% of the patients with giant ulcers and 39% of those with small ulcers died. The incidence of gastric carcinoma was 3% among patients with small ulcers and 6% among those with giant ulcers. Neither of these differences was significant. The incidence of anemia was higher in patients with giant ulcers, but low serum iron levels were found in both groups. Of 385 patients with gastric carcinoma treated over the same period, 23 had ulcers larger than 3 cm in diameter. These results suggest that in patients with giant gastric ulcers a nonsurgical approach should be followed until surgery is required. A surgical approach should not be adopted just because the ulcer is large.

6111 CARBONIC ANHYDRASE AND INHIBITION OF GASTRIC SECRETION BY ACETAZOLAMIDE. *(Rum.)* Puscas, I. (Simleul-Silvaniei Hosp., Judetul Salaj, Rumania). *Med. Interna (Bucur.)* 25 (10):1243-1252, 1973.

6112 CLINICAL VALUE OF STUDING THE ACID-SECRETING AND ACID-NEUTRALIZING FUNCTIONS OF THE STOMACH FOR SELECTING A METHOD TO TREAT PEPTIC ULCER. *(Rus.)* Linar, E. Iu.; Pantsyrev, Iu. M.; Gramenitskii, A. B.; Ageichev, V. A. (Latvian Sci. Res. Inst. Exp. Clin. Med., USSR). *Khirurgiia (Mosk.)* (10):67-71, 1973.

6113 CHROMOGASTROSCOPIC METHOD FOR VISUAL EXAMINATION OF ACID-SECRETING FUNCTION AND THE SECRETORY TOPOGRAPHY OF THE STOMACH. *(Rus.)* Savel'ev, V. S.; Buianov, V. M.; Balalykin, A. S. (N. I. Pirogov 2nd Moscow Med. Inst., USSR). *Khirurgiia (Mosk.)* (10):55-61, 1973.

6114 DEGENERATED ANASTOMOTIC PEPTIC ULCERS AFTER GASTROENTEROSTOMY AND GASTRECTOMY. *(Fr.)* Ribet, M.; Faillon, J. M.; Latreille, J. P.; Houcke, M. (no affil.). *Chirurgie* 99(10):734-740, 1973.

6115 VAGOTOMY WITH MINIMAL GASTRIC RESECTION IN THE TREATMENT OF PEPTIC ULCER. *(Rus.)* Kuzin, M. I.; Postolov, P. M.; Chistova, M. A.; Chistov, L. V. (I. M. Sechenov 1st Moscow Med. Inst., USSR). *Khirurgiia (Mosk.)* (9):58-63, 1973.

6116 NEW FINDINGS ON THE PATHOGENESIS OF GASTRIC ULCER. *(Rum.)* Gheorghescu, B. (Ctr. Gastroenterol., Bucharest, Rumania). *Med. Interna (Bucur.)* 25(10):1157-1166, 1973.

6117 TREATMENT OF PEPTIC ULCER WITH ULCESIUM. *(Por.)* Penteado, J. F. (Ipanema Hosp., Rio de Janeiro, Brazil). *Folha Med.* 67(2):251-267, 1973.

6118 EFFECTS OF ACETAZOLAMIDE ON GASTRIC SECRETION IN MAN. *(Rum.)* Puscas, I. (Simleul Silvaniei Hosp., Salaj, Rumania). *Med. Interna (Bucur.)* 25(10):1225-1242, 1973.

6119 NEW ASPECTS OF THE PATHOPHYSIOLOGY AND TREATMENT OF PEPTIC ULCER. *(Ger.)* Ottenjann, R. (Neuperlach Munic. Hosp., Munich, Germany). *Dtsch. Med. Wochenschr.* 99(24):1321-1324, 1974.

6120 DIAGNOSIS AND TREATMENT OF PEPTIC ULCER AFTER GASTRECTOMY. *(Rus.)* Maiat, V. S.; Pantsyrev, Iu. M.; Kliminskii, I. V.; Nozdrachev, V. I. (N. I. Pirogov 2nd Moscow Med. Inst., USSR). *Khirurgiia (Mosk.)* (10):49-55, 1973.

6121 PEPTIC ULCERS AND PANCREATITIS ASSOCIATED WITH PRIMARY HYPERPARATHYROIDISM (LITERATURE REVIEW). *(Rus.)* Starostin, L. N.; Kertsman, V. I. (Inst. Exp. Endocrinol. Hormone

Chem., Moscow, USSR). *Khirurgiia (Mosk.)* (8):128-133, 1973.

6122 PEPTIC ULCER IN PERSONS OVER 50 YEARS OLD. *(Ger.)* Lechner, H. J. (Munic. Hosp., Solingen, Germany). *Dtsch. Med. Wochenschr.* 99(24):1305-1308, 1974.

6123 PEPTIC ULCER IN THE GREATER CURVATURE OF THE STOMACH. *(Cz.)* Panek, Z.; Skalova, E. (Med. Fac., J. E. P. Purkinje Univ., Brno, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 27(8): 540-542, 1973.

6124 DUODENAL ULCER IN CHILDREN: 21 CASES. *(Fr.)* Saint-Macary, M.; Bouquier, J. J.; Guibert, J.; Nedelec, G.; Umdenstock, R. (Univ. Hosp. Ctr., Limoges, France). *Med. Chir. Dig.* 2(5):309-316, 1973.

6125 ULCERS IN THE DESCENDING DUODENUM. POST-BULBAR ULCERS. *(E.)* Rodriguez, H. P.; Aston, J. K.; Richardson, C. T. (Lackland AFB, Tex.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 119(2): 316-322, 1973.

6126 EFFECTS OF ANTACID, ANTIPEPTIC AND ANTI-CHOLINERGIC AGENTS ON THE DEVELOPMENT AND HEALING OF DUODENAL ULCERS IN THE RAT. *(E).* Okabe, S.; Nakamura, K.; Takeuchi, K.; Takagi, K. (Fac. Pharm. Sci., Univ. Tokyo, Japan). *Digestion* 10:113-121, 1974.

6127 PROBLEMS IN THE MANAGEMENT OF GASTRO-JEJUNAL ULCER. *(E.)* Budhraja, S. N.; Perianayagam, W. J.; Pasupathy, N. K. (Jawaharlal Inst. Postgrad. Med. Ed., Pondicherry, India). *Indian J. Surg.* 35(8):393-402, 1973.

6128 PERFORATED GASTRIC AND DUODENAL ULCERS TREATED BY ROUTINE DIRECT SUTURE. *(E.)* Sava, G.; Thomas, M.; Zussy, M.; Jaeck, D.; Seror, J. (no affil.). *Int. Surg.* 59(4):222-224, 1974.

6129 BEZOAR FORMATION AFTER VAGOTOMY AND PYLOROPLASTY. *(E.)* Wapnick, S.; Solowiejczyk, M. (Ichilov Munic. Governmental Med. Ctr., Tel Aviv, Israel). *Int. Surg.* 59(4):241-242, 1974.

See also, 5833, 5835, 5846, 6011, 6017, 6020, 6024, 6031, 6040, 6157, 6176, 6193, 6198, 6444, 6474.

SMALL INTESTINE

6130 CONGENITAL DUODENAL WEB IN AN ADULT. *(E.)* Mackay, A. G.; Elo, D. E.; Teines, H. (Univ. Vermont Coll. Med., Burlington). *Am. Surg.* 40(6): 355-359, 1974.

A 72-yr-old woman presented with a long history of epigastric pain and occasional vomiting and recent weight loss. A roentgenogram of the upper gastrointestinal tract showed a large obstructed stomach. Through a gastroduodenal incision made to explore the pylorus and duodenal areas, a mucosal web nearly closing the duodenum in the second portion was seen, located about 3 cm above, or proximal to the ampulla of vater. The eccentric opening in the web was 5 mm in diameter. The congenital web was excised and a gastroduodenostomy performed to drain the duodenum beyond the point of former obstruction. Symptoms of duodenal webs include postprandial fullness, epigastric cramping pain, nausea and vomiting. Epigastric peristalsis may be seen in about 25% of the cases. Roentgenographic examination, especially the cine-fluoroscopic studies, are helpful in diagnosis, most often showing an enlarged distended stomach with distended proximal duodenum, ending smoothly and abruptly near the level of the ampulla. Treatment of choice is duodenotomy with excision of the web. Gastroenterostomies can lead to problems with a blind loop syndrome. The distal duodenum must be explored since webs may be multiple. The most likely explanation for the delay of development of symptoms with duodenal webs in adults is intermittent obstruction of the duodenum by food particles, with gradually increasing distention of the proximal duodenum. This causes faulty mechanical functioning of the bowel wall with peristalsis of the duodenum becoming unable to push through this narrowed opening.

6131 DUODENAL PERFORATION: A COMPLICATION OF NEONATAL NASOJEJUNAL FEEDING. *(E.)* Boros, S. J.; Reynolds, J. W. (Children's Hosp., St. Paul, Minn.). *J. Pediatr.* 85(1):107-108, 1974.

Nasojejunal alimentation was begun in a 60-hr-old male infant. A polyvinyl feeding tube (36 inch radio-paque Premature Infant Feeding Tube) was passed into the proximal jejunum and position confirmed. After 8 hr the infant tolerated feedings to full strength Isomil (20 cal/oz) at a rate of 2 ml/hr and the infusion rate was slowly advanced. At 80 hr of age, frequent episodes of apnea with bradycardia were noted. After 16 hr of increasingly frequent apnea spells, a No. 3 Portex tube was passed into the posterior nasopharynx and 1.5-2 cm of end-expuratory pressure applied. At 102 hr, the abdomen became distended and green-stained formula was aspirated from the stomach. Radiograms showed the nasojejunal tube had slipped into the second portion of the duodenum.

Assuming the proximity of the tube to the pylorus was causing the reflux and gastric distension, the tube was advanced an additional 3 cm and feedings continued. At 107 hr of age, episodes of apnea with bradycardia recurred. Radiographs of the chest and abdomen showed only a change in the position of the nasojejunal tube, extended 2-3 cm directly caudal to its previous position in the duodenum. By 122 hr the child required constant ventilation with bag and mask. Abdominal roentgenograms showed a large pneumoperitoneum. Feedings stopped and gastric suction was begun. Laparotomy revealed perforation of the third portion of the duodenum with 2-3 cm length of feeding tube extended through the perforation into the abdominal cavity. Death occurred at 134 hr of age. This case demonstrated the trait of polyvinyl feedings tubes to change dramatically after only a short time in the lumen of the bowel. The tube becomes hard and very stiff, after as little as 6-8 hr. Such a tubing could easily perforate the bowel wall. It is suggested that nasojejunal tubes not be repositioned, but rather removed and replaced.

6132 MESENTERIC ADENITIS: INTESTINAL OBSTRUCTION AND INFARCTION. ONE CASE. *(Sp.)*

Escriva, J.; Cortes Encinas, F.; Perez Clavijo, J. M. (La Fe Munic. Sanit., Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 43(1):75-82, 1974.

A 7-yr-old boy who presented with periumbilical pain, severe vomiting, fever, and constipation had acute diffuse mesenteritis associated with acute mesenteric lymphadenitis at laparotomy. Complete ileus was caused by compression of the lymph nodes and adhesions in the distal ileum. Within 1 yr after surgery to relieve intestinal obstruction, the patient was rehospitalized with repeated vomiting and abdominal pain. A scout film of the abdomen showed dilatation of a loop of the small intestine on the left. A repeat film of the abdomen, taken after abdominal pain had intensified, showed more pronounced dilatation of the small intestine. Both intestinal obstruction and mesenteric infarction were found at surgery. The patient made an uneventful recovery after resection of 40 cm of the small intestine and end-to-end anastomosis. This case illustrates the difficulty of diagnosing these conditions because of nonspecific symptoms and radiological findings.

6133 LYMPHOID HYPERPLASIA OF THE ILEUM. ALWAYS BENIGN DISEASE? *(E.)*

Danis, R.K. (Cardinal Glennon Mem. Hosp. Child., St. Louis, Mo.). *Am. J. Dis. Child.* 127(5):656-658, 1974.

In 6 cases of lymphoid hyperplasia and associated pseudopolyposis (5 boys and 1 girl, aged 2-12 yr) the lesions were sharply limited in the distal 10 cm of ileum in 4 cases and in 1 additional case showed extension into the cecum. The sixth case showed isolated involvement in an 8-cm segment of midjejunum. Surgery was necessary in 5 cases. The remaining case was roentgenographically diagnosed and treated nonoperatively. The clinical course of this condition is varied. Symptoms are usually intermittent and not severe. Spontaneous disapperance over a period of weeks to months is expected. Roentgenographic identification usually allows management by observation in mildly symptomatic patients; or management by steroid therapy in those with major complications such as significant hemorrhage or reducible intussusception. In patients with life-threatening symptoms, surgical exploration is necessary. The lesion presents most often as a sharply limited segmental abnormality of the intestine. The bowel is thickened and has an irregular polypoid consistency. On biopsy examination, marked lymphoid hyperplasia in the mucosa and submucosa with little evidence of adjacent inflammation and a normal overlying mucosa confirm diagnosis.

6134 "LOWER" GASTROINTESTINAL TRACT HEMORRHAGE: NEW CONCEPTS BASED ON ARTERIOGRAPHY. *(E.)*

Casarella, W. J.; Galloway, S. J.; Taxin, R. N.; Follett, D. A.; Pollock, E. J.; Seaman, W. B. (Columbia Coll. Phys. Surg., New York, N. Y.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(2):357-368, 1974.

In 60 consecutive cases of acute rectal hemmorrhage seen over a 5-yr period, arteriography demonstrated the bleeding lesion in 40. All but 1 of these patients were ultimately operated on for removal of the specific bleeding point. In the remaining patient, massive bleeding from a duodenal ulcer was permanently controlled by vasopressin infusion. Colonic diverticulosis was the most common cause of rectal hemorrhage (17 cases) and was present in patients aged 55-84 yr. Most bleeding colonic diverticula were located to the right of the splenic flexure. Arteriography demonstrated that other causes of hemorrhage were arterivenous malformation (4), aortic stenosis and arteriovenous malformation of the right colon (3), duodenal ulcer (4), carcinoma of the colon (3), Meckel's diverticulum (2), jejunal diverticula (2), arteriovenous fistula (2), and Peutz-Jeghers syndrome, local rectal trauma, and ischemic colitis (1 each). In 2 of the 3 elderly patients with aortic stenosis, malformation of the right colon was demonstrated by magnification roentgenograms. One of the arteriovenous fistulas formed after closure of a transverse colostomy for obstructing sigmoid diverticulitis; the other developed in a patient with a gunshot wound of the abdomen. In this series, duodenal ulcers produced a clinical syndrome indistinguishable from lower gastrointestinal hemorrhage in 9 patients. Of the 20 patients with negative arteriograms, 5 required surgery for duodenal ulcers, 4 underwent colectomies, and 1 multiple colotomies. Ten negative patients stopped bleeding spontaneously. The findings indicate that arteriography is the diagnostic method of choice in acute lower intestinal tract hemorrhage.

6135 HYDROXYSTEARIC ACID AND DIARRHOEA FOLLOWING ILEAL RESECTION. *(E.)*

Wiggins, H. S.; Cummings, J. H.; Pearson, J. R. (Central Middlesex Hosp., London, England). *Gut* 15(5):392-395, 1974

To determine a possible cathartic action of 10-hydroxystearic acid, fecal weight and 10-hydroxystearic acid output were measured in 10 patients (5 women and 5 men, aged 36-60 yr) who complained of diarrhea after ileal resection. One series of measurements was done while all patients were on a 3-day diet of 2200 calories containing 85 g fat of which 70 g was olive oil (83.5% oleic glycerides). No relation was found between fecal weight (162-1528 g/day) and hydroxystearic acid production (0.09-9.7 g/day). In 1 patient, fecal weight decreased on the olive oil diet although the 10-hydroxystearic acid output increased to 10 times its initial value. Two other patients showed no significant changes in fecal fat output even when 10-hydroxystearic acid output increased several fold. In 3 of the 10 patients, the output of hydroxystearic acid was reduced when the dietary fat was changed to 70 g coconut oil (75% oleic acid) or to 70 g corn oil (30% oleic acid). There was no reduction in fecal weight. These studies clearly demonstrate that the severity of diarrhea following ileal resection is not related to the amount of 10-hydroxystearic acid present in stools.

6136 INTRALUMINAL DUODENAL DIVERTICULUM. A RARE CAUSE OF ACUTE PANCREATITIS. *(E.)*

Lawson, T. L. (George Washington Med. Ctr., Washington, D. C.) *Am. J. Dig. Dis.* 19(7):673-677, 1974.

A case report of a 14-yr-old boy with acute pancreatitis due to an intraluminal duodenal diverticulum is presented. In this patient, an initial diagnosis of appendicitis was made on the basis of acute onset of abdominal pain, anorexia, nausea, and vomiting. Laparotomy revealed a normal appendix but a large amount of serosanguinous peritoneal fluid containing 30,000 U amylase. The pancreas was edematous and hemorrhagic but there was no obvious etiology of acute pancreatitis. Postoperatively, the patient developed spiking fevers and symptoms of small-bowel obstruction. He was reexplored on the 12th hospital day and multiple adhesions were found throughout the abdomen with several loculated small abcess cavities. Six days after surgery, he was transferred to another hospital where an amylase level of 234 U was recorded. This value rose to 565 U over 2 weeks of treatment with i.v. fluid, antibiotics, and nasogastric suction. Roentgenograms showed the duodenum was dilated and partially obstructed by a large intraluminal duodenal diverticulum. At operation, a large retrogastric pancreatic pseudocyst was exposed and drained, and the membranous intraluminal diverticulum was ruptured. After further surgery to ligate a bleeding artery in the pseudocyst wall, the patient gradually improved and was discharged on the 60th hospital day. Approximately 80% of duodenal webs are located in the 2nd portion of the duodenum and related to the ampulla of Vater. In this patient, the exact site of the ampulla of Vater in relation to the attachments of the intraluminal diverticulum was not identified. Only 4 previous cases of acute pancreatitis associated with an intraluminal dudodenal diverticulum have been reported.

6137 ANGIOGRAPHIC FINDINGS IN TWO CASES OF MECKEL'S DIVERTICULUM WITH RECURRENT BLEEDING. *(Ger.)*

Friedmann, G.; Butzler, H.-O.; Wehrle, J. (Radiol. Inst., Univ. Cologne, Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 120(4):446-452, 1974.

Case reports are presented for 2 children, a 5.6-yr-old boy and a 12-yr-old girl, who developed recurrent melena. Seldinger's technique was used to demonstrate the superior mesentric artery. In the first case an atypical artery, several cm long, originated from the ileocolic artery and followed a corkscrew-like path with changes in its diameter. In contrast to the other arteries visualized, it remained contrasted into the venous phase and was regarded as a vitelline artery, confirming the diagnosis of Meckel's diverticulum. In the second case a deposit of contrast medium was found which remained visible into the venous phase. When this angiographic finding is associated with clinical evidence of gastrointestinal bleeding, it can be interpreted as extravasation. A Meckel's diverticulum was removed from both patients. Histological examination of both specimens showed that the diverticulum was covered, for the most part, with gastric mucosa. Ulceration and localized chronic diverticulitis was present in the first case, while a recent peptic ulcer was found in the second.

6138 HYPEROXALURIA IN PATIENTS WITH ILEAL RESECTION: AN ABNORMALITY IN DIETARY OXALATE ABSORPTION. *(E.)*

Earnest, D. L.; Johnson, G; Williams, H. E.; Admirand, W. H. (San Francisco Gen. Hosp., Calif.) *Gastroenterology* 66(6):1114-1122, 1974.

Intestinal oxalate absorption, as reflected by renal oxalate excretion, was studied in 20 normal subjects, in 15 patients (24-60 yr of age) with an ileostomy who had total colectomy for either ulcerative or granulomatous colitis, and in 11 patients (28-57 yr of age) who had ileal resection for regional enteritis. Urinary excretion of an oral load of ^{14}C-oxalate was increased in the 7 patients with extensive (≥100 cm) ileal resection, but was normal in the 4 patients with minimal (<50 cm) ileal resection. Approximately 6% of the oxalate in 100 mg of spinach was absorbed and excreted in urine by normal subjects, by ileostomy patients and by patients with minimal ileal resection. None of these experienced hyperoxaluria. However, patients with extensive ileal resection had hyperoxaluria and excreted about 30% of supplemental spinach oxalate by the urine. Despite the presence of hyperoxaluria, urinary glycolate was normal in all patients. Severe fat malabsorption was noted in all patients with extensive ileal resection. A direct relation was demonstrated between dietary fat malabsorption and urinary oxalate excretion. Increasing the dietary fat content of an otherwise constant diet further increased urinary oxalate excretion in hyperoxaluric patients. Thus it is suggested that excessive malabsorbed fatty acids may decrease the amount of intraluminal calcium available for binding with dietary oxalate and thereby facilitate abnormal oxalate absorption leading to hyperoxaluria and nephrolithiasis in patients with extensive ileal resection or disease.

6139 FAT-REDUCED DIET IN THE TREATMENT OF HYPEROXALURIA IN PATIENTS WITH ILEOPATHY. *(E.)*

Andersson, H.; Jagenburg, R. (Dept. Clin.

Nutr. Chem. Univ. Goteborg, Sweden). *Gut* 15(5): 360-366, 1974.

Thirteen patients (6 women and 7 men, mean age 38 yr.) with ileopathy were studied under metabolic ward conditions, first on a 100-g fat diet and later on a 40-g fat diet. Ten of the patients were studied after 3-27 months on a fat-reduced diet. Ten of the patients had a high urinary oxalate excretion on the high-fat diet compared with a control group. The patients with fecal fat output of more than 15 g a day showed a reduction in oxalate excretion when the fat intake was decreased; and in the follow-up study, the oxalate excretion was low in all patients except in one with a remaining steatorrhea. There was a correlation between urinary oxalate excretion and fecal output of fatty acids. It is postulated that a low intraluminal calcium ion concentration, mainly caused by the high fatty acid content, explains the hyperoxaluria. The low-fat diet, which also reduced the diarrhea and increased the urinary output, was acceptable to the patients. This diet is recommended for patients with ileopathy to reduce the risk of formation of renal calculi.

6140 ACUTE TERMINAL ILEITIS AND Yersinia INFECTION. *(E.)* Gurry, J. F. (St. George's Hosp. Med. Sch., London, England). *Br. Med. J.* 2(5913):264-266, 1974.

A case history is presented of a 12-year-old boy with pain in the right iliac fossa, together with fever, vomiting, and lack of bowel movement. Laparotomy showed free serous fluid, a thickened and slightly congested retrocecal appendix, an inflamed, erythematous, indurated 8 cm of terminal ileum with serosal hyperemia extending on to the cecum, and enlarged lymph nodes in the small-bowel mesentery. The appendix was removed, and specimens of lymph node biopsies and of free peritoneal fluid were taken. Benzylpenicillin was administered, and recovery was uneventful. Histologically the appendix showed a non-specific hyperplasia of the lymphoid follicles with moderate submucosal fibrosis. Epithelioid granulomata were not seen and there was no evidence of an acute intramural inflammatory process. The lymph nodes showed pronounced sinus hyperplasia with no epithelioid granulomata or other specific features. *Yersinia* antibody titers were diagnostic of *Y. pseudotuberculosis* infection with a type 1 titer of 1/10,240. The organism was isolated from the appendix and was sensitive to ampicillin, tetracycline, co-trimoxazole, gentamicin, and cephalothin sodium but not to sulphonamides. There was no growth of the organism from cultures of the lymph node, peritoneal fluid, or feces. The differential diagnosis includes in particular acute Crohn's disease. With acute terminal ileitis due to Crohn's disease, there may be significant past history or evidence at laparotomy or later from barium studies of other segmental intestinal involvement, usually the cecum. In all cases of acute terminal ileitis found at laparotomy, appendectomy, culture and histological examination of the resected organ, culture of free peritoneal fluid, blood, feces and urine, and serological tests for *Yersinia* are recommended. Barium studies should be performed postoperatively if Crohn's disease is suspected.

6141 HETEROTOPIC GASTRIC MUCOSA OF ILEUM CAUSING ACUTE INTUSSUSCEPTION. *(E.)* Katsube, Y.; Lebhar, N. M.; Noto, A. C.; Hughes, W. (Norwalk Hosp., Conn.). *Conn. Med.* 38(4):156-158, 1974.

A case report is presented of a 6-yr-old boy with acute intestinal intussusception secondary to ileal gastric mucosa. One week after admission for mild upper respiratory infection, the patient suddenly developed para-umbilical pain associated with nausea. The pain became cyclic and more colicky. He had intermittent bile-stained emesis and passed three diarrheal stools, then a "current jelly" stool. A clinical diagnosis of intussusception was made. Physical examination revealed a well-nourished, dehydrated child, with a slightly distended abdomen and palpable ill-defined mass in the umbilical area. Roentgenograms showed marked dilation of small intestinal loops and air-fluid levels. Emergency barium enema examination revealed an intussusception in the hepatic flexure during initial fluoroscopic examination. The intussusception was reduced proximally to the region of the ileocecal valve during fluoroscopy. When meniscus sign was observed on x-ray, standard radiographic techniques were used but reduction was incomplete: postevacuation films demonstrated a large, soft issue density opposite the mid ascending colon. Following administration of i.v. fluids for correction of dehydration, emergency surgery was performed. No intussusception was found at laparotomy, indicating spontaneous reduction, but many enlarged lymph nodes were observed in the mesentery of the bowel. About 30 cm proximal to the ileocecal valve there was slight protrusion beginning from the mesenteric border of the lateral wall of the ileum. Within the protrusion there was a pink, polypoid mass 0.9 cm wide and 2.0 cm long. The elliptical mass was fixed to the ileal wall. The mass was excised, the small intestine was closed transversely, and an incidental appendectomy was performed. The patient was discharged on the 6th postoperative day. Histologically, the polypoid mass consisted of well-differentiated gastric mucosa with many parietal cells within the mucosal glands. In this patient, mesenteric lymphadenopathy and recent respiratory infection may have accelerated intestinal peristalis, and disposed to intestinal intussusception.

6142 EFFECT OF LOW-RESIDUE FOOD ON INDOMETHACIN-INDUCED INTESTINAL LESIONS IN RATS. *(E.)* Drees, D. T.; Robbins, T. L.; Crago, F. L. (Warren-Teed Pharmaceuticals Inc., Columbus, Ohio). *Toxicol. Appl. Pharmacol.* 27(1):194-199,1974.

To show whether prevention of indomethacin-induced gastrointestinal irritation and ulceration by food deprevation on the day of administration of the drug might be related to the avoidance of nondigestible residual components in the diet, experiments were carried out on the effect of administration of indomethacin to Sprague-Dawley rats on low residue (W-T Low Residue Food) and high residue (Purina Laboratory Chow) diets. In rats fed Purina Laboratory Chow, a single large dose of indomethacin (16 mg/kg) produced intestinal perforations in 100% of the animals and adhesions within 72 hr. When the laboratory chow was replaced with W-T Low Residue Food, no intestinal perforations or adhesions were observed. Feeding low-residue food only on the day indomethacin was administered prevented adhesions and perforations. In contrast, laboratory chow fed only on the day the drug was administered resulted in 100% incidence of intestinal lesions. The addition of increasing amounts of cellulose or laboratory chow to low-residue foods resulted in increasing amounts of fecal residue and a corresponding increase in intestinal ulcer incidence and severity. These results indicate that low-residue diets can significantly decrease the toxicity of indomethacin in rats and that their possible use for reducing gastrointestinal side effects caused by indomethacin and other anti-inflammatory agents in man warrants further investigation.

6143 NON-NEUROGENIC INTESTINAL TUMORS IN VON RECKLINGHAUSEN'S DISEASE. *(Sp.)* Rivas Rodero, S.; Ramos Freixa, J. (La Fe Munic. Sanit., Valencia, Spain). *Rev. Esp. Enferm Apar. Dig.* 43(1): 69-74, 1974.

Case reports are presented for a 2-yr-old boy and a 1-yr-old girl with cutaneous neurofibromatosis who had multiple leiomyomas in the duodenum and jejunum, resp. In addition, the girl had an adenomatous polyp of the stomach. Both patients presented with gastrointestinal bleeding. The association between von Recklinghausen's disease and leiomyomas of the small intestine is difficult to explain if neurofibromatosis is considered to be only a neuroectodermal anomaly. It is suggested that this condition involves both the neural ectoderm and mesoderm which would account for the development of tumors and dysplasia in a great variety of organs and tissues. It is recommended that staining with Masson's trichrome or alcian blue be used to distinguish between neurofibromas and leiomyomas and that phosphotungsticacid-hematoxylin be used to demonstrate the existence of myofibrils in the cytoplasm. Silver impregnation methods are also useful since they show reticulin fibers encircling the cells in leiomyomas.

6144 CONGESTIVE AND HEMORRHAGIC LESIONS OF THE DUODENUM: ENDOSCOPIC AND BIOPSY FINDINGS. *(Fr.)* Cheli, R.; Aste, H.; Ciancamerla, G. (San Martina Hosp., Genoa, Italy). *Arch. Fr. Mal. App. Dig.* 63(2):109-113, 1974.

After premedication with meperidine hydrochloride (100 mg), promethazine hydrochloride (50 mg), and atropine (0.5 mg) and local anesthesia with lidocaine, endoscopic examinations of the duodenum were performed with an Olympus GIF esophagogastroduodenoscope and 3 biopsies were removed from each of 29 patients, aged 20-68 yr. To rule out the possibility of trauma, none of these patients had dyskinesia of the antrum, pylorus, or duodenum which might cause or favor retrograde intussusception at duodenoscopy and no aspiration was performed. None of the patients had any diseases which would favor bleeding (alcoholism, liver disease, or hemorrhagic disorders) and none had recently taken any medication known to cause gastrointestinal bleeding. These patients presented with painful dyspepsia (13 cases), hyposthenic dyspepsia (13 cases), and dyspepsia associated with cholelithiasis (3 cases). Radiological examination showed no significant changes in the duodenum. Duodenoscopy revealed disseminated petechiae and ecchymoses in the anterior and posterior mucosa of the duodenal bulb in 5 cases. In 2 of these patients the lesions extended into the 2nd part of the duodenum, and in 2 other patients they were limited to the 2nd part of the duodenum. Areas of congestion were present in 11 patients. These lesions were limited to the bulb in 6 cases, to the 2nd part of the duodenum in 2 cases, and were present in the 1st and 2nd parts of the duodenum in 2 cases. In 9 cases congestion was associated with petechiae and ecchymoses. These lesions were located in the bulb (4 cases) or in the 1st and 2nd parts of the duodenum (5 cases). Histological examination of biopsied material showed the presence of congestion in all cases associated with hemorrhagic extravasation which was particularly evident in the villi. Hemorrhagic infiltration was occasionally associated with microerosions in the epithelium of the villi. Vascular congestion of the muscularis mucosae was not observed as frequently. Although small leukocyte infiltrates were present, only 2 patients had superficial duodenitis. It is concluded that these congestive and hemorrhagic lesions of the duodenum result from vascular disorders rather than inflammation.

6145 CLINICAL AND RADIOLOGICAL CONSIDERATION OF DUODENAL DIVERTICULA. *(Rum.)* Jocu, I.; Ernest, I. (Dr. I. Cantacuzino Hosp., Bucharest, Rumania). *Med. Interna (Bucur.)* 25(11):1313-1318, 1973.

6146 GASTRIC AND DUODENAL BIOPSY ON ENDOSCOPIC MATERIAL. *(It.)* Faccioli, G. (Hosp. Inst., Verona, Italy). *Fracastoro* 66(1/2):20-23, 1973.

6147 CYTOLOGICAL FINDINGS IN DUODENITIS. *(It.)* Recaldin, E. (Hosp. Inst., Verona, Italy). *Fracastoro* 66(1/2):24-26, 1973.

6148 RADIOLOGICAL AND ENDOSCOPIC CORRELATIONS IN DUODENITIS. *(It.)* Sossai, M. (Osp. Maggiore, Verona, Italy). *Fracastoro* 66(1/2):11-14, 1973.

6149 CHRONIC INTESTINAL OBSTRUCTION - FACT OR FICTION? *(E.)* Cantor, M. O. (no affil.). *Abdom. Surg.* 16(5):133-138, 1974.

6150 BACTERIOLOGY OF THE GASTROINTESTINAL TRACT IN CHILDREN. *(Sp.)* Neto, U. F. (Sao Paulo Hosp., Paulist Sch. Med., Brazil). *Acta Gastroenterol. Latinoam.* 5(4):195-212, 1973.

6151 A CASE OF DUODENAL TUBERCULOSIS. *(E.)* Lockwood, C. M.; Forster, P. M.; Catto, J. V. F.; Stewart, J. S. (West Middlesex Hosp., England). *Am. J. Dig. Dis.* 19(6):575-579, 1974.

6152 SHUNT-OPERATION FOR OBESITY. *(Fr.)* Jensen, H. E.; Schwartz, H. (Kommunehosp., Copenhagen, Denmark). *Ann. Gastroenterol. Hepatol. (Paris)* 9(3):237-248, 1973.

6153 PATHOLOGIC FEATURES OF ENTERIC INFECTION WITH Yersinia enterocolitica. *(E.)* Bradford, W. D.; Noce, P. S.; Gutman, L. T. (Duke Univ. Sch. Med., Durham, N.C.). *Arch. Pathol.* 98(1):17-22, 1974.

6154 RETARDED DEVELOPMENT OF THE ENTERIC NERVE CELLS. *(E.)* Erdohazi, M. (Hosp. Sick Children, London, England). *Dev. Med. Child Neurol.* 16(3):365-368, 1974.

6155 INTESTINAL OBSTRUCTION DUE TO HERNIATION THROUGH RIGHT FORAMEN OF BOCHDALEK IN AN ADULT. *(E.)* Nerlikar, N. A.; Mehta, M. J. (B. J. Med. Coll., Poona, India). *Indian J. Surg.* 35(6):294-295, 1973.

6156 CHOLEDOCHODUODENAL FISTULAS. *(E.)* Floman, Y.; Charuzi, I.; Manny, J. (A. Hadassah Univ. Hosp., Jerusalem, Israel). *Int. Surg.* 59(4):239-240, 1974.

6157 A STUDY OF ASCORBIC ACID CONTENT OF GASTRO-DUODENAL MUCOSA IN HEALTHY INDIVIDUALS, AND IN PATIENTS WITH CHRONIC PEPTIC ULCER. *(E.)* Gupta, A. S.; Sharma, V. P. (Med. Coll., Udaipur, Rajasthan, India). *Surg. J. Delhi* 8(3/4/5):11-13, 1973.

6158 ILEUS IN THE DUODENAL REGION IN THE NEWBORN. *(Ger.)* Rickham, P. P. (Pediatr. Clin., Univ. Zurich, Switzerland). *Munch. Med. Wochenschr.* 116(22):1115-1118, 1974.

6159 USE OF INTUBATION FOR CHILDREN WITH ILEUS. *(Rus.)* Doletskii, S. Ia.; Bliau, O. R.; Pasherstnik, L. A.; Arapova, A. V.; Litvinova, R. I. (I. V. Rusakov Munic. Children's Hosp., Moscow, USSR). *Khirurgiia (Mosk.)* (9):71-74, 1974.

6160 CARCINOID TUMOR OF THE SECOND PART OF THE DUODENUM IN A 12-YEAR-OLD CHILD: CEPHALIC DUODENOPANCREATECTOMY. *(Fr.)* Mousseau, M.; Miniconi, P.; Le Neel, J. C.; Bergerault, P.; Lenne, Y.; Leborgne, J. (Univ. Hosp. Ctr., Nantes, France). *Chirurgie* 99(8):591-596, 1973.

6161 REGULATION OF GASTROINTESTINAL MOTILITY. *(Rus.)* Vishnevskii, A. A.; Vilianskii, M. P.; Livshits, A. V.; Pavlychev, R. Kh. Kostiuchenko, V. I.; Kolpachkov, V. A. (Yaroslavl Med. Inst., USSR). *Khirurgiia (Mosk.)* (9):54-57, 1973.

6162 GASTROINTESTINAL BLEEDING CAUSED BY A LEIOMYOMA IN THE SMALL INTESTINE: DIAGNOSTIC VALUE OF SELECTIVE ARTERIOGRAPHY. *(It.)* Dall'Antonia, F.; Farello, G. A. (Inst. Special Surg. Pathol. Clin. Propedeutics, Univ. Padua, Italy). *Acta Chir. Ital.* 29(1):127-134, 1973.

6163 DISEASES OF THE SMALL INTESTINE. *(Por.)* Fraga, F.; Sindorf, E. A. (Fac. Med., Petropolis, Brazil). *Folha Med.* 67(3):275-281, 1973.

6164 THE HISTOPATHOLOGY AND CLASSIFICATION OF DUODENITIS: BIOPSY EXPERIENCE. *(It.)* Cheli, R. (Munic. Hosp., Genoa, Italy). *Fracastoro* 66(1/2):7-10, 1973.

6165 CHOLEDOCHODUODENOSTOMY: AN 18 YEAR STUDY OF 175 CONSECUTIVE CASES. *(E.)* Degenshein, G. A. (Maimonides Med. Ctr., Brooklyn, N.Y.). *Surgery* 76(2):319-324, 1974.

6166 GIANT DUODENAL DIVERTICULA. *(E.)* Millard, J. R.; Ziter, Jr., F. M. H.; Slover, W. P. (Hartford Hosp., Conn.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(2):334-337, 1974.

6167 IS THE INCIDENCE OF Yersinia enterocolitica INFECTION INCREASING? *(E.)* Toivanen, P.; Toivanen, A.; Olkkonen, L.; Aantaa, S. (Dept. Med. Microbiol., Turku Univ., Finland). *Acta Pathol. Microbiol. Scand.* [*B*] 82(2):303-304, 1974.

6168 ADULT COELIAC DISEASE WITH RENAL CARCINOMA. *(E.)* Paull, A.; Hall, P.; Ratnaike, R. N.; Grant, A. K. (Queen Elizabeth Hosp., Woodville, Australia). *Aust. NZ J. Med.* 4(1):62-65, 1974.

6169 ILEOSTOMY IN PREGNANCY. *(E.)* Hudson, C. N. (Royal Hosp. St. Bartholomew, London, England). *Med Chir. Dig.* 2(6):359-361, 1973.

6170 OAT CELL TUMOR OF THE SMALL BOWEL. *(E.)* Toker, C. (Mount Sinai Sch. Med., New York, N.Y.). *Am. J. Gastroenterol.* 61(6):481-483, 1974.

6171 DUODENAL DUPLICATION CYSTS: DIAGNOSIS AND OPERATIVE MANAGEMENT. *(E.)* Ackerman, N.

B. (Menorah Med. Ctr., Univ. Missouri, Kansas City). *Surgery* 76(2):330-333, 1974.

6172 BONE MINERAL CONTENT IN FOUR OBESE SUBJECTS BEFORE AND AFTER INTESTINAL SHUNT OPERATION. A PRELIMINARY REPORT. *(E.)* Dalen, N.; Hallberg, D. (Karolinska Sjukhuset, Stockholm, Sweden). *Acta Chir. Scand.* 140(4):267-270, 1974.

See also, 5767, 5962, 5966, 6003, 6005, 6006, 6037, 6056, 6057, 6075, 6080, 6083, 6084, 6091, 6092, 6101, 6125, 6128, 6227, 6308, 6415, 6423, 6462, 6471, 6508.

SMALL INTESTINE

Malabsorption

6173 ^{15}N STUDIES OF ENDOGENOUS FAECAL NITROGEN IN INFANTS. *(E.)* Read, W. W. C.; McLaren, D. S.; Tchalian, M. (Sch. Med., American Univ. Beirut, Lebanon). *Gut* 15(1):29-33, 1974.

In this study of nitrogen absorption, fecal nitrogen was analyzed as to its source, whether directly from the diet or endogenous. Four male Arab infants (3-12 months old) suffering from acute and severe energy-protein malnutrition of the marasmic type or fully recovered from the condition were tested. Before the first meal of the day, ^{15}N-yeast protein (0.7 mg ^{15}N/kg) was administered by stomach tube. Carmine, mixed with the first meal after such administration, acted as a stool marker. All stool samples, passed shortly after the labelled protein was given and up to 100 hr thereafter, contained measurable amounts of ^{15}N, only a part of which was from an unabsorbed source as shown by the presence of carmine. No difference in the mean excretion of total ^{15}N (0.4% of dose) in carmine-marked stools was apparent between marasmic and recovered subjects. In the 2nd part of this study, 3 other infants, 2 marasmic and 1 recovered, received i.v. ^{15}N-urea (1 mg ^{15}N/kg); and nitrogen from this source appeared in all stools passed during the 72 hr experimental period. In general, these findings show that labelled nitrogen is incorporated into the feces by 3 different routes: (1) in water-soluble materials, products of absorption and metabolism of the test substances; (2) unabsorbed materials; and (3) in water-insoluble materials, primarily components of bacterial and sloughed-off intestinal cells, which are the 2 main types of cells present in stools. It is suggested that bacteria may be a site of amino acid synthesis. Some of these bacterially-synthesized amino acids might be released into the intestinal lumen, and thereby act as an auxiliary supply of essential and nonessential amino acids during starvation.

6174 INTESTINAL LYMPHANGIECTASIA: REPORT OF A CASE WITH ASYMMETRICAL JAUNDICE. *(E.)* Garcia-Alvarez, J.; Reverte-Cejudo, D.; Bernaldo-De-Quiros-Gonzalez, J.; Valle-Jimenez, A. (Clin. Hosp., Univ. Complutense, Madrid, Spain). *Digestion* 10(1):73-81, 1974.

A 22-yr-old man exhibited chronic diarrhea, assymmetrical edema, and hypoproteinemia. Both the diarrhea and asymmetrical edema had been present since childhood. The protein intake was normal, no evidence of liver failure was found, and the urine contained no protein. The assumption that the gastrointestinal tract was responsible for the hypoproteinemia was confirmed by the ^{131}I-polyvinylpyrrolidone test, which indicated the presence of a protein-losing enteropathy. A histopathological study of the small bowel showed extremely dilated lacteals. This finding, together with the asymmetrical edema and onset in childhood, demonstrated the presence of intestinal lymphangiectasia. A mechanical explanation for the loss of substances into the gut lumen was suggested by the occurrence of endothelial gaps and of amorphous material with lipid droplets at both sides of the endothelial walls of the lacteals. Except for a slightly abnormal D-xylose test, this case is an almost typical example of primary intestinal lymphangiectasia. During his hospitalization, the patient developed acute viral hepatitis, evidenced by jaundice, enlargement and tenderness of the liver, SGOT 1300 U, and SGPT 1260 U. All signs returned to normal after 1 month, but the jaundice took more time to disappear on the left side of the body. Two asymmetric skin biopsies, taken from both forearms, showed no abnormality or asymmetry of the lymph vessels.

6175 PLASMA POST-HEPARIN LIPOLYTIC ACTIVITY IN PATIENTS WITH MALABSORPTION: EFFECT OF INTRAVENOUS FAT ADMINISTRATION. *(E.)* Press, M.; Thompson, G. R. (Hammersmith Hosp., London, England *Clin. Sci. Mol. Med.* 46(6):743-751, 1974.

Plasma lipolytic activity was determined in 13 patients with malabsorption and 14 healthy controls. Before measurements were made, the test subjects were fasted overnight and, 10 min before withdrawal of venous blood, 0.1 mg/kg heparin was injected via an antecubital vein to promote release of lipolytic activity into the circulation. Three different substrates were used: very low-density lipoprotein (VLDL), prepared from normal fasting plasma within 24 hr of use, and 2 artificial substrates, i.e. a coconut oil emulsion and triolein. Lower post-heparin lipolytic activities were found in malabsorbers, no matter which substrate was used, but activities rose in malabsorbers after therapeutic doses of an i.v. fat emulsion (Intralipid), especially when VLDL was used as the substrate. The lipolysis shown by sera of both malabsorbers and controls was inhibited by 0.5 M sodium chloride when VLDL was the substrate but not when the 2 artificial substrates were used. This indicated that post-heparin lipolytic activity is heterogenous in origin and was consistent with the concept that post-heparin lipolytic activity, measured with artificial triglyceride substrates, largely reflects liver triglyceride lipase, while activity measured with VLDL reflects adipose tissue lipase.

6176 BACTERIAL PATHOGENESIS OF STEATORRHEA IN GASTRECTOMIZED PATIENTS: STUDY OF JEJUNAL BACTERIA CAPABLE OF DECONJUGATING BILE SALTS.

(It.) Sammarro, L.; Ferri, S. (Inst. Clin. Gen. Med. Med. Therap., Univ, Bologna, Italy). *Arch. Ital. Mal. App. Dig.* 37(2):91-101, 1973

Microbiological studies were performed on jejunal aspirates from 15 patients (12 men and 3 women, aged 31-63 yr) who had undergone Billroth II gastroenterostomy for duodenal ulcer more than 6 months previously. All patients were more than 10% below their ideal weight and all but 3 had steatorrhea. No bacteria were isolated in jejunal aspirates from 3 patients, while 3 or 4 species were found in each of the aspirates from the remaining 12 patients. The most common species was *Escherichia coli* (11 cases) followed by *Proteus* (7), *Streptococcus faecalis* (6), *Staphylococcus* (5), and *Strep. haemolyticus* (4) and *viridans* (2). *Candida* was isolated in 4 cases, but no anaerobic bacteria were detected. Quantitatively normal flora were present in only 1 patient (fewer than 10^4 colonies/ml aspirate). *E. coli* was present in larger numbers (10^6 colonies/ml aspirate) than *Strep. faecalis* (10^3 colonies/ml aspirates). With the exception of *Strep. faecalis,* none of these organisms is capable of deconjugating bile salts. It is suggested that steatorrhea in these patients is probably due to changes in motility, gastrointestinal insufficiency, and mucosal atrophy, rather than to deconjugation of bile salts by the intestinal flora.

6177 JEJUNAL MUCOSAL IMMUNOGLOBULIN-CONTAINING CELLS AND JEJUNAL FLUID IMMUNOGLOBULINS IN ADULT COELIAC DISEASE AND DERMATITIS HERPETIFORMIS.

(E.) Lancaster-Smith, M.; Kumar, P.; Marks, R.; Clark, M. L.; Dawson, A. M. (St. Bartholomew's Hosp., London, England). *Gut* 15(5):371-376, 1974.

Densities of immunoglobulin-containing plasma cells in the jejunal mucosa and serum, and jejunal fluid immunoglobulins, were measured in 14 patients with adult celiac disease and 14 with dermatitis herpetiformis with and without jejunal mucosal abnormality. There were 14 controls. Studies were performed in patients before and after treatment of the jejunal lesion with a gluten-free diet. Total immunofluorescent plasma cells were increased in untreated adult celiac disease and dermatitis herpetiformis patients with jejunal lesions, but in general the normal predominance of IgA>IgM>IgG was found. There was no difference from controls in IgA-containing cells in the two conditions before or after treatment. The numbers of IgM-containing cells were significantly increased both before and after treatment in groups of patients with adult celiac disease and dermatitis herpetiformis who had jejunal lesions. IgG-containing cells were significantly raised in only the before-treatment groups. Patients with dermatitis herpetiformis without jejunal lesions, even while on gluten-containing diets, had normal numbers of immunoglobulin-containing cells. IgA and IgM jejunal fluid immunoglobulins were significantly raised in dermatitis herpetiformis and adult celiac disease. It is concluded that patients with dermatitis herpetiformis with jejunal morphological abnormality have an immunological disturbance of the jejunal mucosa comparable to that found in adult celiac disease.

6178 FAT ABSORPTION AFTER INFUSING BILE SALTS INTO THE HUMAN SMALL INTESTINE. *(E.)*

Shimoda, S. S.; O'Brien, T. K.; Saunders, D. R. (Univ. Washington Sch. Med., Seattle). *Gastroenterology* 67(1):7-18, 1974.

Absorptive cell abnormalities during fat absorption have recently been demonstrated by electron microscopy in some patients with small intestinal stasis syndrome. Whether deconjugated bile salts, produced by jejunal bacteria, might cause these abnormalities was tested by feeding an intragastric liquid test meal (egg lipids, linseed oil, and phenol red marker) to 3 normal volunteers after prior overnight infusion with conjugated or unconjugated bile salts or with bicarbonate-buffered saline. No definite morphological evidence of injury to jejunal absorptive cells was discerned after infusing 1 or 2 mM deoxycholate. In biopsy sections, the only consistent difference was seen after overnight infusion of deoxycholate, i.e., a marked decrease in the numbers of fat particles in the apical areas of absorptive cells located 10-20 cells below the villus tip. This finding was not seen after overnight infusion of conjugated bile salts or buffered saline, or after no overnight infusion. A marked decrease in apical fat particles was also observed in 3 patients with stasis syndrome after overnight deoxycholate infusing. The abnormality may be explained by an inhibitory effect of unconjugated bile salts on reesterification of free fatty acids by the jejunal mucosa.

6179 THE CELL POPULATION OF THE UPPER JEJUNAL MUCOSA IN TROPICAL SPRUE AND POSTINFECTIVE MALABSORPTION.

(E.) Montgomery, R. D.; Shearer, A. C. I. (East Birmingham Hosp., England). *Gut* 15(5):387-391, 1974.

The lymphocyte and plasma cell population in jejunal biopsy specimens from 12 patients with tropical sprue acquired in Southeast Asia or the Middle East was compared with that in 9 cases of post-infective malabsorption arising in Western Europe and with 12 cases of untreated celiac disease. Infiltration of the epithelial layer of the upper jejunal mucosa by lymphocytes was found in tropical sprue to the same extent as in celiac disease and, to a lesser extent, in postinfective malabsorption. In all forms of acute sprue, there was increased density of lymphocytes in the lamina propria. With increasing duration and with increasing mucosal atrophy, the lymphocytes were progressively replaced by plasma cells; and the cellular infiltration in chronic sprue was indistinguishable from that of celiac disease. The findings suggest that a humoral antibody response is a feature of sprue and that this becomes more prominent as the condition becomes chronic.

6180 CELLULAR INFILTRATE OF JEJUNAL BIOPSIES IN ADULT COELIAC DISEASE IN RELATION TO GLUTEN WITHDRAWAL. *(E.)* Holmes, G. K. T.; Asquith, P.; Stokes, P. L.; Cooke, W. T. (Dept. Exp. Pathol., Univ. Birmingham, England). *Gut* 15(4):278-283, 1974.

Inflammatory cell counts in the lamina propria and epithelium of jejunal biopsies in 11 patients with adult celiac disease were compared with counts found in 12 controls with no evidence of bowel disease. In the patients with celiac disease, there were significant increases in the number of total cells, plasma cells, and intraepithelial lymphocytes but a significant reduction in lamina propria lymphocytes. Following clinical improvement on a strict gluten-free diet for up to 9 yr, cell counts changed significantly but, with the exception of lymphocytes in the lamina propria, were still abnormal. Analysis of 5 patients in whom the biopsy improved to near normal morphology and of 6 showing no such improvement revealed significantly higher plasma cell counts in the latter but no significant differences between groups for other counts. On the basis of the observed changes in cell counts, there appears little justification for questioning the diagnosis of celiac disease in patients who show unequivocal clinical response to gluten withdrawal but no gross morphological improvement in the jejunal biopsy. It is suggested that local antigenic stimulus with gluten transforms lymphocytes in the lamina propria to plasma cells, while removal of gluten from the diet results in reaccumulation of lymphocytes and a decrease in plasma cells. Persistence of abnormal cell counts in the mucosa after gluten withdrawal suggests that patients continue to ingest enough gluten to stimulate the immune system without producing clinical deterioration or gross morphological abnormalities. Alternatively, the mucosa could be so severely damaged by long exposure to gluten that the normal microstructure cannot be restored after gluten withdrawal.

6181 CHRONIC SKIN DISEASE AND INTESTINAL ABSORPTION: BIOPSY AND FUNCTIONAL STUDY OF THE SMALL INTESTINE IN 35 CASES. *(Fr.)* Matuchansky, C.; Certin, M.; Bognel, J. C.; Bognel, C.; Modigliani, R.; Daniel, F.; Galian, A.; Civatte, J.; Bernier, J. J. (St. Lazare Hosp., Paris, France). *Ann. Med. Interne (Paris)* 125(3):253-259, 1974.

Histological examination of staged ileal and jejunal biopsies and biological tests for malabsorption were performed on 35 patients with untreated chronic skin diseases (group A), and skin and mucosal lesions were systematically investigated in 110 patients who presented with biologically confirmed malabsorption (group B). Patients in group A consisted of 10 with eczema, 15 with psoriasis, 5 with dermatitis herpetiformis, and 5 with miscellaneous skin diseases. Except for 8 patients with watery diarrhea and normal fat excretion, none of these patients had clinical manifestations of malabsorption. Only 2 patients (1 with eczema and 1 with dermatitis herpetiformis) had subtotal villous atrophy, and 5 of the 10 eczema patients had partial villous atrophy. Biological tests revealed that 2 patients with psoriasis had pancreatic insufficiency, steatorrhea, and creatorrhea associated, in 1 case, with microbial overgrowth of the proximal small intestine; 3 other patients had only moderate creatorrhea. In addition to 6 patients with a hyperglycemic response to p.o. lactose loading, 9 had only one abnormal absorption test each. Only 3 patients (2 with psoriasis and 1 with dermatitis herpetiformis) had 2 or 3 abnormal tests (folic acid, vitamin B_{12}, or glucose absorption). No correlation was found between results of absorption tests and histological findings. Strictly normal absorption tests were obtained from 3 of the 5 patients with eczema and partial villous atrophy; the other 2 patients had only 1 abnormal test each (hyperglycemic response to glucose and the Schilling test, resp.). Of 110 patients in group B, only 10 (9%) had skin diseases. The incidence of skin disease in this group was only slightly higher than that in a control group of hospitalized patients. With the exception of a patient with intestinal Hodgkin's disease and general ichthyosis, the skin lesion was never indicative of malabsorption.

6182 COLLAGENOUS SPRUE. *(E.)* Pepper, H. W.; Brandborg, L. L.; Shanser, J. D.; Goldberg, H. I.; Moss, A. A. (Univ. California Sch. Med., San Francisco). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(2):275-282, 1974.

The cause of collagenous sprue is as yet undetermined. Patients with clinical malabsorption, histogically flat mucosa of the jejunum and little or no response to gluten withdrawal are prime suspects. In 3 cases investigated here, jejunal biopsy specimens showed flat mucosa with an abundant deposit of collagen lying beneath the surface epithelium and extending into the lamina propria. Serial and multiple biopsy specimens were required to make the diagnosis, and Trichrome staining was essential. Roentgenograms revealed moderate to severe changes in the proximal small bowel differing somewhat from the characteristic appearance of celiac sprue. Duodenal involvement was present in each of the 3 cases and varied from mucosal thickening of the proximal small bowel to a virtually smooth, featureless rigid pattern. Such features in patients with primary intestinal malabsorption that is partially or totally refractory to strict exclusion of gluten from the diet should alert the radiologist to the possible presence of collagenous sprue. Differentiation of collagenous sprue from celiac sprue allows for a more accurate prognosis and a more definitive treatment for the patient.

6183 DERMATITIS HERPETIFORMIS: IMMUNOLOGIC CONCOMITANTS OF SMALL INTESTINAL DISEASE AND RELATIONSHIP TO HISTOCOMPATIBILITY ANTIGEN HL-A8. *(E.)* Gebhard, R. L.; Falchuk, Z. M.; Katz, S. I.; Sessoms, C.; Rogentine, G. N.; Strober, W. (Natl. Inst. Arthritis, Metabol., Digest. Dis., Bethesda, Md.). *J. Clin. Invest.* 54(1):98-103, 1974.

The relation between the gluten-sensitive intestinal lesion observed in dermatitis herpetiformis and in gluten-sensitive enteropathy was analyzed. Jejunal IgA synthesis in dermatitis herpetiformis was estimated from the extent of incorporation of ^{14}C-leucine into IgA in jejunal biopsy specimens during short-term *in vitro* culture. Dermatitis herpetiformis patients have significantly elevated incorporation values as compared to normal controls, 18,000 vs 5,830 cpm/mg tissue protein/90 min, and the degree of elevation correlated well with the degree of morphologic abnormality. Thus dermatitis herpetiformis patients are similar to gluten-sensitive enteropathy patients where elevated local mucosal IgA synthesis has also been observed. Of the 8 patients with dermatitis herpetiformis and intestinal disease, 7 carried the histocompatibility antigen HL-A8 (87.5%). Of the 7 patients with dermatitis herpetiformis without intestinal disease, 2 had HL-A8 (27%), an incidence not significantly different from that of the general population (20%). Thus the intestinal lesion of dermatitis herpetiformis is similar to that of gluten-sensitive enteropathy, both in respect to local mucosal increase in IgA synthetic rates and in respect to the association with HL-A8.

6184 MALABSORPTION OF FOLIC ACID FOLLOWING PARTIAL GASTRECTOMY. *(E.)* Elsborg, L. (Univ. Dept. Med., Arhus, Denmark). *Scand. J. Gastroenterol.* 9(3):271-274, 1974.

Malabsorption of folic acid was detected by the tritiated folic acid absorption test in 14 of 40 patients (21 men and 19 women, average age 57 yr) who had undergone gastrectomy for benign gastric or duodenal ulcers. The procedures employed were Polya gastrectomy with resection of more than 1/3 of the stomach (29 patients), antrectomy with less extensive resection (4 patients), and the Billroth I operation (3 patients). Apart from gastrectomy, none of these patients had other gastro-intestinal or metabolic diseases which might interfere with folate metabolism. Folate deficiency, defined as serum folate levels below 2.0 ng/ml, was present in 6 patients with reduced folic acid absorption; 5 of these patients also had low whole-blood folate concentrations and 3 had increased urinary formiminoglutamic acid. Overt anemia was present in 1 patient with a megaloblastic bone marrow. In the remaining 8 patients with folic acid malabsorption, serum and whole-blood folate concentrations were normal. The true incidence of folic acid malabsorption in postgastrectomy patients is probably lower than that found in this group since these patients had severe complaints after surgery. It is suggested that folate deficiency in postgastrectomy patients may occasionally originate from malabsorption of dietary folic acid. In some gastrectomized patients, the synthesis of folate by microorganisms in the small intestine apparently compensates for decreased folic acid absorption.

6185 SELECTIVE MALABSORPTION OF VITAMIN B_{12}: REPORT OF A CASE WITH METABOLIC STUDIES. *(E.)* Rubin, H. M.; Giorgio, A. J.; Macdonald, R. R.; Linarelli, L. G. (Mercy Hosp., Pittsburgh, Pa.). *Am. J. Dis. Child.* 127(5):713-717, 1974.

A 9-yr-old boy with selective malabsorption of vitamin B_{12} had megaloblastic anemia, proteinuria, failure to absorb orally administered radioactive vitamin B_{12}, low serum B_{12} level, increased excretion of methylmalonic acid, and absence of intrinsic factor antibodies. The anemia and methylmalonic acid excretion responded quickly to parenteral vitamin B_{12} (1 mg) therapy, but a generalized aminoaciduria persisted. Sufficient therapy was documented by inability to increase urinary methylmalonic acid excretion with an oral DL-valine load. Elevated excretion or clearance of threonine, alanine, tyrosine, histidine, glycine, serine, and leucine was present before and after therapy, supporting the concept of an associated distinct renal tubular defect separate from vitamin B_{12} dependent metabolic pathways. Selective malabsorption of vitamin B_{12} is a rare cause of vitamin B_{12} deficiency in children but should be suspected when megaloblastic anemia is accompanied by proteinuria. Studies such as intrinsic factor antibodies, gastric biopsies, Schilling stages, and mode of inheritance may be necessary to distinguish selective malabsorption of vitamin B_{12} from other vitamin B_{12} deficiency states.

6186 STUDY OF IMMUNOGLOBULIN-CONTAINING CELLS IN THE INTESTINAL MUCOSA OF NORMAL SUBJECTS AND PATIENTS WITH CELIAC DISEASE. *(Sp.)* Serra Desfilis, M. A.; Gasbarrini, G.; Miglio, F.; Rodrigo Gomez, J. M.; Aparisi Quereda, L.; Guix Garcia, J.; Garcia-Conde Gomez, F. J. (Fac. Med., Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 42(3):323-334, 1974.

Biopsies were obtained from the small intestine, 20 cm from the level of the angle of Trietz, from 8 pateints (aged 26-66 yr) with celiac disease who had been treated with a gluten-free diet for 6 months to 3 yr. Twelve subjects (aged 24-56 yr) with no evidence of gastrointestinal or immunological disease served as controls. Examination of the biopsies with immunofluorescence technique showed that the mean densities of IgG- and IgM-type cells were significantly greater in patients with celiac disease, but the densities of IgA-type cells did not differ significantly between patients and controls. It has been suggested that increases in the density of IgM-type cells in celiac disease might be a manifestation of antigen-antibody complex formation. These complexes could secondarily fix complement and produce the lesions of celiac disease. The increase in IgG-type cell density is considered to be a nonspecific finding for which there is no logical explanation.

6187 SELECTIVE MALABSORPTION OF VITAMIN B_{12}: REPORT OF A CASE AND STUDIES OF VITAMIN B_{12} ABSORPTION. *(E.)* Koide, R.; Kikuchi, K.; Tsunematsu, Y. (Natl. Child. Hosp., Tokyo, Japan). *Keio J. Med.* 22(1):45-57, 1973.

A boy aged 2 yr and 10 months who was born of consanguineous parents presented with megaloblastic anemia. The patient excreted 123 mg/day methylmalonic acid, which increased to 268 mg/day on loading with L-valine, a precursor of methylmalonyl coenzyme A. Abnormal excretion of methylmalonic acid has been reported in some cases of vitamin B_{12} deficiency; moreover, vitamin B_{12} acts as a coenzyme of isomerase in the pathway from methylmalonyl coenzyme A to succinyl coenzyme A. The conclusion that the megaloblastic anemia was due to vitamin B_{12} deficiency was supported by the striking response to treatment with vitamin B_{12} (1000 μg i.m.). The urinary methylmalonic acid level returned to normal (4 mg/day), while a remarkable reticulocytosis was apparent within one day of treatment and a marked increase in hemoglobin within 4 days. As the Schilling test was performed 5 times over the 4-month treatment period, the patient received 5 i.m. injections of 1000 μg vitamin B_{12}. Anemia disappeared after the 1st dose of vitamin, and both platelet and leukocyte counts returned to normal. The Schilling test indicated that vitamin B_{12} malabsorption was present throughout the anemic and convalescent stages. Addition of intrinsic factor did not increase urinary ^{57}Co-vitamin B_{12}, indicating the absence of pernicious anemia. Other tests revealed no obvious morphological abnormality in the intestinal tract, no significant utilization of vitamin B_{12} by intestinal flora, or chronic pancreatitis. Because his parents were consanguineous and he had benign proteinuria (13-85 mg/dl), it was concluded that the child had selective vitamin B_{12} malabsorption caused by a congenital, functional absorption abnormality in the mucosa of the small intestine. The patient continues to receive p.o. vitamin B_{12} (250 μ/day) and after 20 months maintains a completely normal blood picture.

6188 A CASE OF CELIAC DISEASE: CLINICAL DIAGNOSIS AND CONSIDERATION OF ITS ETIOLOGY AND PATHOGENESIS. *(Fl.)* de Vos, M.; Demeulenaere, L. (Dept. Internal Med., State Univ., Ghent, Belgium). *Tijdschr. Gastroenterol.* 16(2): 117-132, 1973.

6189 STUDY OF THE MECHANISM OF THE INTESTINAL ABSORPTION OF D-XYLOSE. I. RELATIONSHIP BETWEEN AND THE EFFECTS OF THE EXCRETION TEST IN CHILDREN AND THE DOSE ADMINISTERED. *(Pol.)* Zalewski, T.; Radzikowski, A.; Rozental, M. (Acad. Med., Warsaw, Poland). *Pediatr. Pol.* 48(4):411-418, 1973.

6190 MALABSORPTION SYNDROMES. *(It.)* Dareddu, P.; Rossi, L. (Inst. Pediatr., Univ. Milan, Italy). *Minerva Med.* 65(11):581-594, 1974.

6191 PATHOGENESIS OF DISORDERS IN DISACCHARIDE METABOLISM AND ABSORPTION. *(Cz.)* Skal, I.; Pirk, F. (Inst. Clin. Exp. Med., Prague, Czechoslovakia). *Cesk. Fysiol.* 22(6):569-573, 1973.

6192 INTESTINAL MALABSORPTION DUE TO DRUGS. *(E.)* Rahman, F.; Cain, G. D. (Baylor Coll. Med., Houston, Tex.). *Drug Ther.* 4(5): 123-125, 1974.

6193 LACTOSE MALABSORPTION AFTER GASTRIC SURGERY. *(Sp.)*. Guix Garcia, J.; Rodrigo Gomez, J. M.; Aparisi Quereda, L.; Serra Desfilis, M. A.; Tomas Ridocci, M.; Parrilla Paricio, P.; Garcia-Conde Gomez, F. J. (Fac. Med., Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 42(3):281-296, 1974.

6194 LACTOSE INTOLERANCE IN THE SPANISH POPULATION. *(Sp.)* Guix Garcia, J.; Rodrigo Gomez, J. M.; Aparisi Quereda, L.; Serra Desfilis, M. A.; Garcia-Conde Gomez, F. J. (Fac. Med., Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 42(4):367-382, 1974.

6195 ONE CASE OF WHIPPLE'S DISEASE ASSOCIATED WITH PANCREATIC HETEROTOPIA. *(Fr.)* Dewulf, F.; Vielle, G.; Hongque, M. P.; Arianoff, A. A. (St. Elisabeth Clin., Brussels, Belgium). *Rev. Esp. Enferm. Apar. Dig.* 42(4):425-444, 1974.

6196 IDIOPATHIC PULMONARY HEMOSIDEROSIS AND IRON MALABSORPTION IN A PATIENT WITH IgA DEFICIENCY. *(E.)* Sultan, M.; Keene, W. R.; Schwaber, J. R. (Lahey Clin. Fdn., Boston, Mass.). *Lahey Clin. Fdn. Bull.* 23(2):53-62, 1974.

6197 THERAPEUTIC IMPLICATIONS OF ELECTROLYTE, WATER, AND NITROGEN LOSSES DURING RECOVERY FROM PROTEIN-CALORIE MALNUTRITION. *(E.)* Nichols, B. L.; Alvarado M., J.; Rodriguez S., J.; Hazlewood, C. F.; Viteri, F. (Baylor Coll. Med., Houston, Tex.). *J. Pediatr.* 84(5):759-768, 1974.

6198 STUDY OF FECAL FAT EXCRETION AFTER GASTRIC SURGERY. *(Sp.)* Rodrigo Gomez, J. M.; del Olmo Puchalt, J. A.; Aparisi Quereda, L.; Parrilla Paricio, P.; Guix Garcia, J.; Serra Desfilis, M.; Tomas Ridocci, M.; Castellanos Escrig, G. (Fac. Med., Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 42(1):1-16, 1974.

6199 MALABSORPTION CAUSED BY INTESTINAL HYPERMOTILITY INDUCED BY CHLORAMPHENICOL. *(Rum.)* Dumitrascu, D. (3rd Med. Clin., Cluj, Rumania). *Med. Interna (Bucur.)* 25(10):1253-1257, 1973.

6200 LACTOSE INTOLERANCE IN ARABS. *(Sp.)* Guix Garcia, J.; Rodrigo Gomez, J. M.; Aparisi Quereda, L.; Serra Desfilis, M. A.; Garcia-Conde Gomez, F. J.; Wassel, A. (Fac. Med., Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 43(1):25-34, 1974.

6201 LACTOSE INTOLERANCE IN ADULTS IN CENTRAL AFRICA. *(Fr.)* Elliot, F. G.; Cox, J.; Nyomba, B. L. (Fac. Med., Natl. Univ. Zaire, Kinshasa). *Ann. Soc. Belg. Med. Trop.* 53(2):113-132, 1973.

6202 STUDIES IN INTESTINAL MALABSORPTION SYNDROME DURING INFESTATION OF Lamblia intestinalis IN CHILDREN. *(Pol.)* Kluska, J. (Acad. Med., Lodz, Poland). *Ann. Acad. Med. Lodz.* 13(1):71-90, 1972.

See also, 5765, 5857, 6041, 6043, 6138, 6172, 6273, 6281, 6432, 6467.

LARGE INTESTINE

6203 PATHOLOGY OF COLONIC POLYPS AS IT RELATES TO SURGICAL MANAGEMENT. *(E.)* Enterline, H. T. (Hosp. Univ. Pennsylvania, Philadelphia) *Ann. Clin. Lab. Sci.* 4(3):145,150, 1974.

Polypoid tumors of the colon under 1 cm may be treated conservatively. Of the adenomatous types, large sessile adenomas, villous or otherwise, are best handled by segmental resection or by complete excision followed later by radical surgery if further pathologic examinations indicate this is necessary. The presence of a pedicle is no guarantee of the absence of carcinoma. Although metastases have been reported with carcinoma confined to the head of the stalk polyps, this is so rare that conservative surgery is adequate if the base is clear. This is also true of stalked polyps that appear to be entirely carcinomatous. Lymph node metastases appear to be confined to those adenomas containing sizable areas of carcinoma and which show invasion at least to the depth of the muscle coat. Lymph node metastases from pure carcinomas are not seen except for those in which invasion has occurred to at least the level of the muscle coat. Mixed villous and adenomatous polyps are very common and most polyps larger than 1.5 cm are of mixed type. There appears to be a correlation between the presence of both *in situ* and invasive carcinoma with villoglandular elements. In a series of 174 pure adenomas, only 7% contained *in situ* carcinoma and 1 case, an invasive carcinoma. In 80 mixed villous and glandular adenomas, however, 18.7% contained *in situ* carcinoma and 3 cases, an invasive carcinoma. Biopsies of polypoid lesions of the colon are preferably excisional. In the patient in whom excision is difficult, polyps of estimated size of 1 cm or less can probably be safely followed rather than excised. They should not be ignored since growth and subsequent carcinoma may occur. Since these are high risk populations in which about 20% of the patients will have a frank carcinoma somewhere in the colon, careful examinations of the colon should be performed at short intervals.

6204 PNEUMATOSIS INTESTINALIS. *(E.)* Heideman, M.; Darle, N.; Nilsson, A. E. (Sahlgrenska Hosp., Goteborg, Sweden). *Acta Chir. Scand.* 140(2): 164-166, 1974.

Case reports are presented for 2 men (aged 87 and 67 yr) with pneumatosis intestinalis. Both patients presented with meteorism and the older man also had vague abdominal distress and fever. In the latter case, review of x-ray films taken 3 yr previously showed an accumulation of gas-filled cysts in the wall of the signoid colon, while a barium enema study on admission revealed a partial obstruction between the sigmoid and rectum. The obstruction was apparently due to coarse folds of the mucosa. After the patient's sudden death, autopsy revealed fresh cerebral malacia and diffuse peritonitis. Although volvulus was not seen, it is possible that the changes in the mucous lining of the intestine were due to an early attack of volvulus and that the peritonitis was secondary to a perforation of a ruptured gas cyst. The 2nd patient was without clinical evidence of perforation, but free gas in the abdomen was seen on x-rays and was found, along with submucosal cysts, at laparotomy. The patient was discharged after 9 days but died 1 1/2 yr later of a subarachnoid hemorrhage. This case indicates that free gas in the abdomen could mean pneumatosis intestinalis, rather than rupture of gasholding viscus.

6205 POSTOPERATIVE PARENTERAL HYPERALIMENTATION AND WOUND HEALING IN ONCOLOGICAL SURGERY. *(It.)* Bozzetti, F.; Terno, G.; Longoni, C. (Natl. Inst. Tumor Res. Ther., Milan, Italy). *Tumori* 60(1): 53-63, 1974.

Only parenteral solutions were administered to 8 patients who had rectal adenocarcinomas for the first 5 days after amputation of the rectum. These solutions contained amino acids and dextrose with smaller quantities of levulose, sorbitol, and ethyl alcohol. Four patients (2 men and 2 women, mean age 57 yr) received a formula containing 12.4 cal/kg/day and 0.044 g N/kg/day (group 1) while the other 4 (3 men and 1 woman, mean age 59 yr) received 52.7 cal/kg/day and 0.235 g N/kg/day (group 2, hyperalimentation). The mean weight of patients given hyperalimentation was lower (52 kg) than those given the other formula (71 kg), but no other criteria were adopted in the selection of therapy. Patients in group (2) also received more than 100 mEq/day potassium, insulin (mean dose of 100 IU/day, and norandrostenolone decanoate (25 mg i.m.) on the first postoperative day. While patients in group (1) were infused for only 12 hr/day, catheters were placed in the subclavian veins of patients in group (2) and they were infused almost continuously for 5 days. Determinations of total nitrogen in 24-hr urine specimens showed that the nitrogen balance was negative in group (1) and positive in group (2). Collagen synthesis was investigated by chromatographic determination of hydroxylysine in biopsies taken from the wounds of these patients 2-15 days after surgery. Mean hydroxylysine contents were 0.013 mg/100 mg tissue for group (1) and 0.0250 mg/100 mg tissue for group (2), suggesting that hyperalimentation may promote wound healing. The postoperative course was similar in all patients. Among patients in group (2) no metabolic disorders associated with hyperalimentation or complications caused by catheterization of the subclavian vein were observed.

6206 PATHOLOGY OF INTESTINAL POLYPS: A HISTOLOGICAL COMPARISON OF ADENOMAS IN AUTOPSY AND SURGICAL MATERIAL. *(Jap.)* Sato, E.; Ouchi, A. (Med. Sch., Tohoku Univ., Sendai, Japan). *Jap. J. Cancer Clin.* 19(12):1159-1167, 1973.

To confirm the basic relation between cancer and polyps of the large intestine, pathological investigations were made of material from 1000 autopsied patients and 122 patients who underwent surgery. In autopsied patients the incidence of adenoma was 9.5% (10% in males and 8.8% in females). Hypertrophic mucosal tags occurred in 3.5%, juvenile polyps in 0.3%, Peutz-Jeghers polyps in 0.2%, and hyperplastic (metaplastic) polyps in 1.1%. The incidence of adenomas increased with advancing age. Of the adenomas, 55.1% were found in the right colon, 25.4% in the left colon, and 19.5% in the sigmoid and rectum. Histological examinations revealed that atypia was more pronounced in adenomas in the distal part of the large intestine than in those in the proximal part. Atypia was more pronounced in material from operated patients than in that from autopsy cases.

6207 RADIATION-INDUCED CARCINOMA OF THE RECTUM. A LATE COMPLICATION OF PELVIC IRRADIATION. *(E.)* Qizilbash, A. H. (Henderson Gen. Hosp., Hamilton, Canada). *Arch. Pathol.* 98(2): 118-121, 1974.

Adenocarcinoma of the rectum developed in a 61-yr old woman 24 yr after she received pelvic irradiation (1600 r deep x-ray therapy and 5865 mg/hr radium) for squamous cell carcinoma of the cervix. The resected bowel showed evidence of radiation changes with ulceration and stricture formation, the latter first observed 9 yr after irradiation. A well-differentiated papillary carcinoma had developed at the margins of the ulcer with infiltration into the muscle coat of the rectum. The bowel wall at this site was severely sclerosed with fibrosis of the submucosa and the muscular layer. In addition, arteries within the wall of the rectum showed typical radiation changes such as hyalinization with disruption of elastic fibers. No regional lymph node involvement was demonstrated, and the patient remains alive and well 6 1/2 yr after surgery. This case indicated the need for careful follow-up studies on patients with radiation-induced proctocolitis. Any ulcerated or suspicious lesions should be biopsied to rule out development of a carcinoma.

6208 NON-INVASIVE COLONOSCOPIC POLYPECTOMY. *(E.)* Panish, J. F.; Berci, G. (Cedars Lebanon Hosp., Los Angeles, Calif.). *West. J. Med.* 121(1): 6-9, 1974.

During 111 colonoscopies on 100 consecutive patients (68 men and 32 women, aged 36-88 yr), 183 polyps were removed by electrosurgery. Polypectomies were performed on patients who had polypoid lesions in the colon measuring more than 1 cm in diameter on barium enema, and any polypoid lesion was removed, regardless of size if there was a history of family history of colonic polyps or carcinoma. Many small polyps were suctioned back through the colonoscope in fragmented form. Of the 35 polyps not recovered, all measured less than 1 cm in diameter and 2/3 (22) were under 0.5 cm. The majority of these small polyps were not detected with barium enema and were not the occasion for colonoscopy. The vast majority of polyps were benign adenomas. Seven adenomas and 1 villous adenoma showed carcinomatous changes. Resections were performed on 6 of these 8 patients, and no residual tumor was found in the pathological specimen in 4. Well-defined stalks were present on 2 of the 3 lipomas. Only 2 patients bled, and no perforations occurred in this series. Colonoscopic polypectomy costs less and entails less time in the hospital than laparotomy, colotomy and polypectomy.

6209 STUDIES OF HUMAN AMEBIASIS. II. LIGHT AND ELECTRON-MICROSCOPIC OBSERVATIONS OF COLONIC MUCOSA AND EXUDATE IN ACUTE AMEBIC COLITIS. *(E.)* Pittman, F. E.; El-Hashimi, W. K.; Pittman, J. C. (Med. Univ. South Carolina, Charleston). *Gastroenterology* 65(4):588-603, 1973.

Early amebic lesions in the sigmoid colon of 9 patients with unequivocal acute amebic colitis were studied in mucosal biopsy specimens and exudates. Material aspirated from all patients contained large numbers of motile hematophagous trophozoites of *Entamoeba histolytica* in a thick mucopurulent hemorrhagic exudate. In biopsies, a diffuse inflammatory process with or without superimposed focal ulceration was observed whether amebae were present in the tissue or not. Amebae were rarely found except at the superficial portions of the ulcers; even when present in large numbers at the surface ulcers, they were not seen deep in the mucosa or submcuosa. In addition, amebae were not found in the crypts of Lieberkuhn at any level, and were not observed penetrating intact epithelium or entering the lamina propria through microulcerations. Trophozoites were separated from viable tissue by a zone of necrotic material; interglandular surface epithelium appeared to be lysed prior to invasion by trophozoites. Ultrastructurally, microvilli were decreased in size, and number, mitochondria were swollen, vesicles of endoplasmic reticulum dilated, and the cytoplasms markedly vesiculated. In some areas, intracellular spaces were distended with edema fluid which appeared to escape into the lumen of the colon between surface epithelial cells. These findings suggest that the mucosal inflammatory process preceded focal epithelial ulceration and may be the result of toxic products released by amebae. Release of lysomal like vesicles from the surface membrane of amebae or rupture of amebae may be mechanisms by which toxic products are released.

6210 PERORAL KANAMYCIN PROPHYLAXIS IN COLON SURGERY. *(E.)* Gruner, O. P. N.; Ladehaug, B. (Ulleval Hosp., Oslo, Norway). *Acta Chir. Scand.* 140(2):156-158, 1974.

The effects of p.o. kanamycin and of postoperative chloramphenicol with penicillin were compared in 2 randomized groups of patients subjected to colon surgery. Administration of the kanamycin was begun 3 days before surgery, with an initial dose of 1 g given hourly 4 times and thereafter 1 g every 6 hours until the day of operation. Penicillin was administered twice at a dose of 1.5 million U, and chloramphenicol was given 4 times at a dose of 0.5 g/day, for 3 days after surgery. Use of kanamycin gave less favorable results, particularly with reference to suppuration, temperature above 39 C, need for additional antibiotics, more than 3 weeks hospital stay, and uneventful postoperative course. It was concluded that kanamycin prophylaxis was not beneficial and might be harmful.

6211 A LOW APPROACH FOR REMOVAL OF CANCERS OF THE RECTAL AMPULLA: THE PARACHUTE TECHNIQUE. *(Fr.)* Francillon, J.; Moulay, A.; Vignal, J.; Tissot, E. (Edouard Herriot Hosp., Lyon, France). *Nouv. Presse Med.* 3(21):1365-1367, 1974.

6212 DIVERTICULUM OF THE VERMIFORM APPENDIX. *(Ger.)* Jelesijevic, V. (Med. Fac., Rhineland-Westphalian Technical Coll., Aachen, Germany). *Anat. Anz.* 135(3):226-234, 1974.

6213 PREVENTION OF POSTOPERATIVE THROMBOEMBOLIC COMPLICATIONS IN RECTAL CANCER. *(Rus.)* Kozhevnikov, A. I.; Parakhoniak, V. I.; Kasum'ian, S. A. (Gor'ki Med. Inst., USSR). *Khirurgiia (Mosk.)* (9):144-149, 1973.

6214 STATISTICS ON 105 CASES OF MECKEL'S DIVERTICULUM. *(Fr.)* Fresnel, P. L.; Foucher, G.; Sibilly, A. (Univ. Hosp. Ctr., Strasbourg, France). *Ann. Chir.* 27(9):943-952, 1973.

6215 THE RESULTS OF OUTPATIENT TREATMENT OF HAEMORRHOIDS BY RUBBER BAND LIGATION. *(E.)* Panda, A. P.; Laughton, J. M.; Elder, J. B.; Gillespie, I. E. (Royal Infirm., Manchester, England). *Gut* 15(4):346, 1974.

6216 MASSIVE HEMORRHAGE FROM COLONIC DIVERTICULA. *(E.)* Franchini, A.; Giardino, R. (St. Orsola Univ. Hosp., Bologna, Italy). *Abdom. Surg.* 16(5):111-117, 1974.

6217 COMPLICATIONS OF HIRSCHSPRUNG'S DISEASE IN THE ADULT. *(E.)* McGarity, W. C.; Cody, J. E. (Emory Univ. Sch. Med., Atlanta, Ga.). *Am. J. Gastroenterol.* 61(5):390-393, 1974.

6218 THOSE OTHER TYPES OF ENTEROCOLITIS. *(E.)* Tully, T. E.; Feinberg, S. B. (Univ. Hosp., Univ. Minnesota, Minneapolis). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(2):291-300, 1974.

6219 TOTAL INVERSION APPENDECTOMY, MODIFIED. *(E.)* Alvear, D. T.; Callahan, D. J.; Pilling, IV, G. P.; Cresson, S. L. (St. Christopher's Hosp. Children, Philadelphia, Pa.). *Am. Surg.* 40(7):413-416, 1974.

6220 EXAMINATION OF THE ANORECTUM IN CHILDREN: APPLICATION TO MEGACOLON. *(Fr.)* Meunier, P.; Mollard, P.; Jaubert de Beaujeu, M. (Debrousse Hosp., Lyon, France). *Lyon Chir.* 70(3):164-168, 1974.

6221 CARCINOEMBRYONIC ANTIGEN IN THE DIAGNOSIS AND MANAGEMENT OF COLORECTAL CARCINOMA. CURRENT STATUS. *(E.)* Livingstone, A. S.; Hampson, L. G.; Shuster, J.; Gold, P.; Hinchey, E. J. (Montreal Gen. Hosp., Canada). *Arch. Surg.* 109(2): 259-264, 1974.

6222 SIGMOID MYOTOMY: A RETROSPECTIVE STUDY OF 28 PATIENTS. *(E.)* Taylor, S. A.; Good, C. S.; Porter, N. H. (Royal Sussex County Hosp., Brighton, England). *Br. J. Clin. Pract.* 28(5): 155-156, 1974.

6223 SOME PROBLEMS IN NONOPERATIVE TREATMENT OF ACUTE APPENDICITIS. ANALYSIS OF IMMEDIATE AND LONG-TERM RESULTS IN 995 CASES. *(E.)* Anonymous (Nan K'ai Hosp., Tientsin, China). *Chinese Med. J.* 54(2):21, 1974.

6224 TREATMENT OF THE NEUROPATHIC BOWEL BY ELECTRICAL STIMULATION OF THE RECTUM. *(E.)* Katona, F.; Eckstein, H. B. (State Inst. Neurosurg., Budapest, Hungary). *Dev. Med. Child Neurol.* 16(3):336-339, 1974.

6225 DIVERTICULAR DISEASE OF THE COLON. *(E.)* Shapiro, J. L. (Vanderbilt Univ. Sch. Med., Nashville, Tenn.). *South. Med. J.* 67(6):710-722, 1974.

6226 THE CONTINUING PROBLEMS OF PERFORATED APPENDICITIS. *(E.)* Ackerman, N. B. (Menorah Med. Ctr., Univ. Missouri, Kansas City). *Surg. Gynecol. Obstet.* 139(1):29-32, 1974.

6227 ABNORMAL DISTRIBUTION OF PIGMENTATION IN A CASE OF PEUTZ-JEGHAR'S SYNDROME. *(E.)* Gupta, R. K.; Bhargava, K. N.; Singh, M. P. (S.M.S. Med. Coll. Hosp., Jaipur, India). *Surg. J. Delhi* 8(3/4/5/):39-41, 1973.

6228 ENDOMETRIOSIS OF THE COLON: REPORT OF 14 PATIENTS REQUIRING PARTIAL COLECTOMY. *(E.)* McSwain, B.; Linn, R. J.; Haley, Jr., R. L.; Franklin, R. H. (Vanderbilt Univ. Sch. Med., Nashville, Tenn.). *South. Med. J.* 67(6):651-658, 1974.

6229 ISCHEMIC COLITIS FOLLOWING RECTAL PROLAPSE. *(E.)* Kawarada, Y.; Satinsky, S.; Matsumoto, T. (Hahnemann Med. Hosp., Philadelphia, Pa.). *Surgery* 76(2):340-343, 1974.

6230 ISCHEMIC COLITIS. *(E.)* Marshak, R. H.; Lindner, A. E.; Ruoff, M. (Mt. Sinai Sch. Med., New York, N.Y.). *Am. J. Gastroenterol.* 61(6):484-488, 1974.

6231 DIVERTICULA OF THE COLON IN IBADAN, NIGERIA. *(E.)* Bohrer, S. P.; Lewis, E. A. (Univ. Coll. Hosp., Ibadan, Nigeria). *Trop. Geogr. Med.* 26(1):9-14, 1974.

6232 HYPOTONIC GASTROINTESTINAL X-RAY STUDIES. *(E.)* Yates, Sr., C. W.; Yates, Jr., C. W.; Keegan, J. M. (St. Joseph Hosp., Houston, Tex.). *Tex. Med.* 70(7):73-79, 1974.

6233 A PHASE 2 STUDY OF INTERMITTENT HIGH DOSE ISOPHOSPHAMIDE THERAPY OF ADVANCED COLORECTAL CANCER. *(E.)* Kovach, J. S.; Schutt, A. J.; Hahn, R. G.; Reitemeier, R. J.; Moertel, C. G. (Mayo Clin., Rochester, Minn.). *Oncology* 29(1):34-39, 1974.

6234 COLITIS FOLLOWING ORAL LINCOMYCIN THERAPY. *(E.)* Pittman, F. E.; Pittman, J. C.; Humphrey, C. D. (Med. Univ. South Carolina, (Charleston). *Arch. Intern. Med.* 134(2):368-372, 1974.

6235 GIANT SIGMOID DIVERTICULUM. *(E.)* Rabinowitz, J. G.; Farman, J.; Dallemand, S.; Twerskey, J.; Rosen, Y. (State Univ. New York Downstate Med. Ctr., Brooklyn). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(2):338-343, 1974.

6236 LARGE DIVERTICULUM OF THE ANAL CANAL. CASE REPORT AND REVIEW OF THE LITERATURE ON ANAL CANAL AND RECTAL DIVERTICULA. *(E.)* Govoni, A. F.; Smulewicz, J. J. (Queens Hosp. Ctr., Jamaica, N.Y.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(2):344-347, 1974.

6237 VILLOUS ADENOMA: THE PREMALIGNANT DILEMMA. *(E.)* Richardson, J. D.; Parker, J. C. (Univ. Kentucky Med. Ctr., Lexington, Ky.). *Am. Surg.* 40(7):406-412, 1972.

6238 FAMILIAL SOLITARY CARCINOMA OF THE LARGE INTESTINE. *(Jap.)* Noji, N.; Yamagiwa, H. (Noji Surg. Clin., Mie Prefectural Univ., Tsu, Japan). *Jap. J. Cancer Clin.* 19(11):1115-1120, 1973.

See also, 5997, 6005, 6007, 6009, 6010, 6025, 6038, 6069, 6140, 6154, 6159, 6161, 6167, 6240, 6340, 6472, 6505, 6507.

LARGE INTESTINE

Ulcerative Colitis

6239 CLINDAMYCIN (CLEOCIN) COLITIS. *(E.)* Cohen, L. E.; Smith, C. J.; Pister, J. D.; Wells, R. F. (Brooke Army Med. Ctr., Fort Sam Houston, Tex.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(2):301-304, 1974.

Clindamycin hydrochloride hydrate (150 mg 4 times/day p.o.), a synthetic antibiotic widely used against gram-positive and anaerobic organisms, caused severe protracted colitis in 6 patients. The main clinical feature was the sudden onset of severe diarrhea and abdominal pain mimicking inflammatory or vascular bowel disease. All patients required hospitalization despite cessation of clindamycin therapy. Barium enema examinations revealed that 3 patients had marked mucosal abnormalities. The abnormalities consisted of diffuse ulcerations, irregular mucosal masses, or uniform nodularity of the entire colon and rectum. An additional finding in 1 patient was the occurrence of toxic megacolon. These cases indicate that the roentgenographic findings of clindamycin colitis are nonspecific but suggestive of idiopathic ulcerative colitis, ischemic or infectious colitis, or Crohn's disease. Diagnosis of clindamycin colitis was established by the proctoscopic finding of unique cream-colored, plaque-like lesions superimposed on a friable or edematous mucosa. Biopsy of the plaque-like lesions revealed nonspecific inflammatory changes; no pathogens were obtained on culture. Treatment consisted of i.v. hydrocortisone, hydrocortisone enemas, and replacement of p.o. intake with i.v. fluids. This is the first detailed description of radiological findings in this type of colitis.

6240 AUTOLYMPHOCYTOTOXINS IN ULCERATIVE COLITIS AND CARCINOMA OF THE COLON. A LESION OF TOLERANCE. *(E.)* Sion, A.; Friedell, M. T. (Dept. Lab. Med., Jackson Park Hosp., Chicago, Ill.). *Int. Surg.* 59(3):141-146, 1974.

Serum from 16 patients with ulcerative colitis and 14 normal controls was tested for autolymphocytotoxicity. The reaction was of the cold type, maximal at 15 C, and was complement-dependent. This suggested that the antibodies were of a low affinity type or that the reaction was restricted to a limited number of immunodeterminants on the lymphocyte surface, accounting for the apparent elution at higher temperatures. Under the conditions used in the test, serum from 2 patients with adenocaranomas of the colon destroyed 65% of the target lymphocytes; that from 4 untreated patients, 55%; that from 3 patients with subtotal colectomy, 45%; and that from 7 prednisone-treated patients, about 10%, the same as that from normal controls. The blocking action of prednisone on the development of autolymphocytotoxicity in colitis patients was reversed after treatment was discontinued. It is hypothesized that carcinoembryonic antigen found in patients with malignant tumors of the colon and a modified type of secretory immunoglobulin A may have common immunodominant reactive surfaces recognized by the lymphocyte. This possibility is supported by previous reports of the occurrence of carcinoembryonic antigen in tumors arising from tissues secreting exocrine type immunoglobulin A and in patients with ulcerative colitis.

6241 ORIGINAL SURGICAL TECHNIQUE FOR THE TREATMENT OF ULCERATIVE RECTOCOLITIS. *(It.)* Gaspari, A. (3rd Clin. Gen. Surg. Surg. Ther., Univ. Rome, Italy). *Prog. Med. (Roma)* 29(3):82-91, 1973.

6242 LONG-TERM THERAPY OF ULCERATIVE COLITIS WITH A PODOPHYLLIN CYTOSTATIC AGENT. *(Cz.)* Hrncirova, L.; Simkova, Z. (Med. Fac., J. E. Purkyne Univ., Brno, Czechoslovakia). *Vnitr. Lek.* 19(10): 954-960, 1973.

6243 RELATION BETWEEN PROTEIN LOSS AND CHANGES IN INTESTINAL MORPHOLOGY IN IDIOPATHIC PROCTOCOLITIS. *(It.)* de Marco, G.; Piaggi, V.; Boraldi, F.; Franzin, G. (Inst. Clin. Gen. Med. Med. Therapy, Univ. Modena, Italy). *Arch. Ital. Mal. App. Dig.* 37(1):19-30, 1973.

6244 RADIOLOGY OF ACUTE TOXIC MEGACOLON. *(E.)* Werbeloff, L.; Novis, B.; Bank, S.; Marks, I. N. (Groote Schuur Hosp., Cape Town, South Africa). *S. Afr. Med. J.* 48(21):912, 1974.

6245 PRIMARY TOTAL PROCTOCOLECTOMY FOR ULCERATIVE COLITIS. *(E.)* Lulu, D. J.; Dragstedt, L. R. (VA Hosp., Des Moines, Iowa). *Am. Surg.* 40(7):417-420, 1974.

6246 BETTER TREATMENT IN INFLAMMATORY BOWEL DISEASE. *(E.)* Goldstein, F.; Thornton, J. J. (Thomas Jefferson Med. Coll., Philadelphia, Pa.). *Consultant* 14(7):96-103, 1974.

See also, 5990, 6134, 6169, 6507, 6513.

PANCREAS

6247 STUDIES OF GLUCAGON SECRETION IN PANCREATECTOMIZED PATIENTS. *(E.)* Muller, W. A.; Brennan, M. F.; Tan, M. H.; Aoki, T. T. (Peter Bent Brigham Hosp., Boston, Mass.). *Diabetes* 23(6):512-516, 1974.

Studies were conducted to determine if intestinal glucagon-like material that cross-reacts with antiglucagon antiserum is true glucagon derived from alpha cells in the intestinal tract. Arginine was infused (460 mg/kg i.v. over 40 min) in 2 totally pancreatectomized patients and 2 age- and sex-matched normal controls. Concentrations of plasma glucagon and of plasma glucagon-like immunoreactive (GLI) substances were determined with the aid of a relatively specific antiserum (30-K), an antiserum with intermediate specificity (02-K), and a nonspecific antiserum (78-J). Plasma glucagon levels, as measured with 30-K, did not increase in the pancreatectomized patients but increased 4-to 6-fold in controls. Assays of GLI with 02-K revealed similar differences. Assays of GLI with 78-J gave high, erratic results which lacked significance. Results of charcoal pretreatment of plasma indicated that interfering substances did not completely account for the basal level of total glucagon immunoreactivity measured in pancreatectomized patients with 30-K antiserum. The material in excess of the 20-30 pg/ml binding to charcoal is either true glucagon or represents substances cross reacting nonspecifically with the antiserum. If it represents a polypeptide identical to pancreatic glucagon, it originates in cells not responsive to arginine. If it represents nonspecific cross reactivity with 30-K, no glucagon antibody is entirely pancreatic-glucagon specific. The absence of plasma glucagon response to arginine in pancreatectomized patients suggests that extrapancreatic sites do not contain significant numbers of normally functioning alpha cells.

6248 COMPARATIVE DIAGNOSTIC VALUE OF ENDOSCOPIC PANCREATOGRAPHY AND PANCREATIC FUNCTION TESTS. *(E.)* Nakano, S.; Horiguchi, Y.; Takedo, T.; Suzuki, T.; Nakajima, S. (Ogaki Munic. Hosp., Japan). *Scand. J. Gastroenterol.* 9(4):383-389, 1974.

Endoscopic pancreatography, the pancreozymin-secretin test, urinary amylase determinations, and the glucose tolerance test were performed on 120 patients. Diagnosis consisted of cholelithiasis (15 cases), choledocholithiasis (12), chronic pancreatitis (21), carcinoma of the pancreas (7), and other diseases of the liver and duodenum (65). While abnormalities in pancreatograms were variable, 86% of the patients who had irregularity of the pancreatic duct had abnormal pancreozymin-secretin tests. The percentage of patients with irregularities of the pancreatic duct was best correlated with the degree of pancreatic dysfunction. In general, the incidence of pancreatic dysfunction increased as the diameter of the duct increased. Pancreatic dysfunction was found in about 35% of the patients who had normal pancreatograms. There were instances in which pancreatic function tests were of no value and an endoscopic pancreatogram was crucial for the diagnosis. Pancreatograms in patients with carcinoma of the pancreas were classified into 3 groups, and pancreatic function was evaluated. The characteristics of pancreas dysfunction shown by these types might be influenced by the location and size of the lesion. The obstruction type was advanced carcinoma; the carcinoma of the stenosing type was relatively localized; and the narrowing type may be early carcinoma. The lack of opacification of side branches appears to be one of the most important findings in the detection of early stages of carcinoma of the pancreas. Since there is considerable discrepancy between morphological and functional tests, both endoscopic pancreatography and a series of pancreatic function tests are necessary in the diagnosis of pancreatic disease.

6249 CLINICAL, HISTOCHEMICAL, AND ULTRASTRUCTURAL FINDINGS IN A CASE OF VERNER AND MORRISON'S SYNDROME (WDHA). *(Fr.)* Martin, E.; Dubois, F.; Lacourbe, R.; Duchesne, G.; Bonfils, S. (Antoine Beclere Hosp., Clamart, France). *Arch. Fr. Mal. App. Dig.* 63(3):229-240, 1974.

6250 SELECTIVE ABDOMINAL ARTERIOGRAPHY FOR THE DIAGNOSIS OF PRIMARY AND METASTATIC TUMORS OF THE LIVER AND PANCREAS. *(Sp.)* Lecuna Torres, V.; Guelrud, M. B.; Salazar, T. S.; Sanchez Flores, A.; Brito, J. R.; Leon Leon, R.; Valencia-Parparcen, J. (Univ. Hosp., Caracas, Venezuela). *GEN* 27(3/4): 213-242, 1973.

6251 UTILIZATION OF ENZYMATICALLY HYDROLYZED SOYBEAN PROTEIN AND CRYSTALLINE AMINO ACID DIETS BY RATS WITH EXOCRINE PANCREATIC INSUFFICIENCY. *(E.)* Imondi, A. R.; Stradley, R. P. (Warren-Teed Pharmaceuticals, Inc., Columbus, Ohio). *J. Nutr.* 104(6):793-801, 1974.

6252 CANCER OF THE PANCREAS. *(Rus.)* Orlov, V. A.; Savchenko, A. P.; Kalinicheva, M. V.; Verkhovskaia, P. B.; Lukovnikova, L. P. (N. M. Sechenov 1st Moscow Med. Inst., USSR). *Sov. Med.* (6):106-111, 1973.

6253 DIRECT SERIAL MAGNIFICATION PANCREATIC ARTERIOGRAPHY FROM A POINT OF VIEW OF DIAGNOSING PANCREATIC CANCER AT ITS EARLY STAGE. *(Jap.)* Takashima, T .; Shin, M.; Yamamoto, I.; Asano, Y. (Kanazawa Univ. Hosp., Japan). *Jap. J. Cancer Clin.* 19(12):1168-1172, 1971.

6254 GASTROINTESTINAL BLEEDING WITH PANCREATIC DISEASE. *(E.)* Schapiro, R. H.; Goldabini, J. J. (Massachusetts Gen. Hosp., Boston). *New Engl. J. Med.* 291(6):295-301, 1974.

6255 THE PANCREAS IN KWASHIORKOR-LIKE DISEASE OF MINIATURE SWINE. *(E.)* Taylor, J. L. (Univ. Missouri, Columbia). *Diss. Abs. Int. B* 34(11):5742, 1974.

See also, 5998, 6001, 6006, 6012, 6021, 6022, 6032, 6044, 6195, 6265, 6449, 6451, 6464.

PANCREAS

Pancreatitis

6256 OBSERVATIONS DURING TREATMENT OF ACUTE PANCREATITIS WITH INSULIN AND GLUCOSE INFUSION. *(E.)* Hallberg, D.; Theve, N. O. (Karolinska Inst., Stockholm, Sweden). *Acta Chir. Scand.* 140(2):138-142, 1974.

Twenty patients with acute pancreatitis were treated only with i.v. drop infusion of 5.5% glucose solution with 20 IU/1000 ml of insulin. All patients had blood glucose levels above 100 mg/100 ml, elevated amylase values in blood and/or urine, and elevated free fatty acids in plasma. Of the 20 patients, 10 had a proven history of alcohol abuse and 12 had a positive x-ray examination for gallstones. The infusion rate was fast during the 1st hr (300-400 ml) and was then reduced according to the disappearance of abdominal pain. Fifteen patients became free from pain within 4 hr, 9 of these within 1 hr. In 3 patients the abdominal pain lasted 72 hr or longer, and in 2 patients with long-lasting elevation of amylase in urine, pain returned as soon as treatment was discontinued. These 2 patients later developed pancreatic cysts and underwent surgery. All patients were completely recovered at time of discharge. The beneficial effects of insulin and glucose are ascribed to the inactivation of the hormone-sensitive lipase present in adipose tissue where fat necrosis develops.

6257 MASSIVE HEMORRHAGE FROM THE CELIAC AXIS IN PANCREATITIS. *(E.)* Schecter, L. M.; Gordon, H. E.; Passaro, Jr., E. (VA Wadsworth Hosp. Ctr., Los Angeles, Calif.). *Am. J. Surg.* 128(2): 301-305, 1974.

Case reports are presented for 4 men, aged 30-73 yr, with chronic pancreatitis and massive hemorrhage from the celiac axis. Concomitant intra-abdominal hemorrhage was noted in 2 patients. One case marks the first reported incidence of a documented pseudoaneurysm of the left gastric artery secondary to chronic pancreatitis. Celiac axis arteriography was helpful in establishing the diagnosis and determining proper surgical management. Total gastrectomy with esophagojejunostomy had to be performed because of marked erosion, inflammation, and scarring of the fundus. Two other patients had pseudoaneurysms of the splenic artery; only 1 of these 2 patients had a pancreatic pseudocyst. Three patients survived. Extensive gastric resection was required in 3 patients. An early and continued aggressive diagnostic approach is needed in patients with chronic pancreatitis and/or pseudocyst and significant upper gastrointestinal bleeding.

6258 OBSERVATIONS ON GLUCAGON TREATMENT IN PANCREATITIS. *(E.)* Fleischer, K.; Kasper, H.; (Med. Clin., Univ. Wurzburg, Germany). *Scand. J. Gastroenterol.* 9(4):371-376, 1974.

Of 25 patients treated with glucagon (19 with 6-12 mg/day i.v. and 6 with the same dose of a sustained-action preparation i.m., for 3-12 days), 9 (5 males and 4 females, mean age 45 yr) had acute pancreatitis and 16 (14 males and 2 females, mean age 39 yr) had chronic relapsing pancreatitis. Abdominal pain was alleviated or disappeared in 12 of the 15 patients who suffered from it, and a persistent decrease in serum lipase activity occurred in 15 of 22 patients with abnormally high values. In 8 patients serum lipase activities increased again after glucagon had been discontinued, and in 1 patient lipase activity remained normal after the end of treatment. Serum lipase activities remained elevated for a longer period in a control group of 33 patients who did not receive glucagon therapy. Glucagon therapy had to be discontinued in 2 patients because of the development of nausea, crampy epigastric pain, and headaches. Since these symptoms disappeared after withdrawal of glucagon and recurred after renewed administration, it is concluded that they are side effects of glucagon. Blood sugar values increased only moderately during glucagon therapy except in 3 patients who had increases of between 200 and 300 mg/100 ml. Severe hemorrhagic necrotizing pancreatitis was discovered at autopsy in the 2 glucagon-treated patients who died. Although these findings demonstrate that glucagon has a beneficial effect on the intensity of abdominal pain and serum lipase activities in acute and chronic relapsing pancreatitis, there is no proof that it shortens the duration of the disease or improves the prognosis. It has been suggested that glucagon acts by inhibiting pancreatic secretion, restricting enzyme synthesis in the acinar cells, reducing intestinal motility, and decreases gastric acid secretion.

6259 PANCREATIC PSEUDOCYSTS IN CHILDREN. *(E.)* Moossa, A. R. (Univ. Chicago Hosp. Clin., Ill.). *J. Roy. Coll. Surg. Edinb.* 19(3):149-158, 1974.

In 10 children (4 boys and 6 girls, aged 3 to 16 yr), pancreatic pseudocysts developed as a result of trauma in 6 and papillary stenosis in 1; their etiology was unknown in 3 cases. All had some degree of epigastric pain and tenderness; 4 presented as acute abdominal emergencies needing urgent laparotomy after resuscitation; 1 had progressive abdominal distension and malaise of a few weeks duration; and others experienced repeated vomiting. A plain radiograph of the abdomen was helpful in only 1 case. Treatment consisted of conservative management in 2 cases, external drainage in 1, cystogastrostomy in 4, cystogastrostomy + partial cyst excision in 1, cystoduodenostomy + later cystogastrostomy in 1, and cystojejunostomy with a Roux-en-Y loop + later sphincterotomy in 1. The best results were obtained with transgastric posterior cystogastrostomy, which appears the safest operation. It is concluded that acute pancreatitis with or without pseudocyst formation must be considered in the differential diagnosis of acute abdominal emergencies in childhood. A raised serum amylase activity makes careful examination and palpation of the pancreas mandatory. Two noninvasive methods of diagnosing pancreatic pseudocysts without special preparation of the patient, scintiscanning with ^{75}Se-selenomethionine and echography, are of great help.

6260 STATUS OF THE BLOOD CLOTTING SYSTEM IN PANCREATITIS. *(Rus.)* Zhukov, N. A.; Bazhenov, E. E. (Omsk Med. Inst., USSR). *Sov. Med.* 36(6):146-147, 1973.

6261 EVALUATION OF NUTRITIONAL FACTORS IN THE GENESIS OF CHRONIC PANCREATITIS IN OUR MIDST. *(Por.)* Mott, C. de B.; Oliveira, N. L.; Bettarello, A. (Clin. Hosp., Fac. Med., Univ. Sao Paulo, Brazil). *Arq. Gastroenterol.* 11(2):65-68, 1974.

6262 FLUCTUATIONS IN PORTAL PRESSURE IN ACUTE EXPERIMENTAL PANCREATITIS. *(Pol.)* Klepacki, A.; Zalewski, J.; Gruszecki, W. (Acad. Med., Bialystok, Poland). *Pol. Przegl. Chir.* 45(11):1311-1316, 1973.

6263 HEMORRHAGE IN ACUTE PANCREATITIS. *(Pol.)* Ciesielski, L.; Trojanowski, W. (Acad. Med., Lodz, Poland). *Pol. Przegl. Chir.* 45(12):1435-1441, 1973.

6264 HEMORRHAGIC NECROTIZING CAPILLARY SYNDROME. *(Sp.)* Soler Canto, J. (no affil.). *Rev. Esp. Enferm. Apar. Dig.* 43(1):61-68, 1974.

6265 CHRONIC RECURRENT PANCREATITIS AND PANCREATIC CANCER. *(Rus.)* Blagovidov, D. F. (no affil.). *Khirurgiia (Mosk.)* (10):84-87, 1973.

6266 PATHOGENESIS OF PANCREATITIS. *(Rus.)* Permiakov, N. K.; Podol'skii, A. E. (N. V. Sklifosovskii Sci. Res. Inst. Emergency Med., Moscow, USSR). *Khirurgiia (Mosk.)* (9):23-29, 1973.

6267 PANCREATITIS. SURGICAL MANAGEMENT. *(E.)* Hermann, R. E.; Al-Jurf, A. S.; Hoerr, S. O. (Cleveland Clin. Fdn., Ohio). *Arch. Surg.* 109(2):298-303, 1974.

6268 THE BILE FACTOR IN EXPERIMENTAL PANCREATITIS. *(E.)* Poncelet, P. R. (McGill Univ., Canada). *Diss. Abs. Int. B* 34(10):5051-5052, 1974.

6269 GLUCAGON IN TREATMENT OF ACUTE PANCREATITIS. *(E.)* Waterworth, M. W.; Barbezat, G. O.; Bank, S. (Groote Schuur Hosp., Cape Town, South Africa). *Lancet* 1(7868):1231, 1974.

6270 CONCENTRATION OF α_2-MACROGLOBULIN IN BLOOD SERUM IN CHRONIC PANCREATITIS, LIVER

CIRRHOSIS AND DIABETES. *(E.)* Geller, L. I.; Kazimirchik, A. P.; Kozlova, Z. P. (Khabarovsk Med. Inst., USSR). *Vopr. Med. Khim.* 19(1):96-99, 1973.

6271 HEREDITARY PANCREATITIS: REPORT OF THE FIRST KINDRED IN ITALY. *(It.)* di Ludovico, A. S.; Dobrilla, G.; Cavallini, G.; Angelini, G.; Vantini, I.; Belloni, G.; Vigna, B. (Inst. Special Med. Pathol. Clin. Methodol., Univ. Padoua, Verona, Italy). *Fracastoro* 66(1/2):35-47,1973.

6272 VIRUS-INDUCED PANCREATIC DISEASE: ALTERATIONS IN CONCENTRATION OF GLUCOSE AND AMYLASE IN BLOOD. *(E.)* Ross, M. E.; Hayashi, K.; Notkins, A. L. (Natl. Inst. Dent. Res., NIH, Bethesda, Md.). *J Infect. Dis.* 129(6):669-676, 1974.

See also, 6002, 6032, 6121, 6136, 6437, 6441, 6443, 6465.

LIVER AND BILIARY TRACT

6273 LIVER ULTRASTRUCTURE IN ABETALIPOPROTEINEMIA: EVOLUTION OF MICRONODULAR CIRRHOSIS. *(E.)* Partin, J. S.; Partin, J. C.; Schubert, W. K.; McAdams, A. J. (Child. Hosp. Res. Fdn., Cincinnati, Ohio). *Gastroenterology* 67(1):107-118, 1974.

A 10-month-old boy was found to have abetalipoproteinemia, substantial hepatomegaly, and persistent elevation of SGOT and SGPT. Liver biopsies were obtained prior to and at 2, 14, and 20 months after initiation of treatment with a medium-chain triglyceride-substituted low fat diet. The initial liver biopsy contained 38% lipid, 91% of which was triglyceride. Hepatocytes contained large fat droplets which ruptured to form centrilobular fatty lakes. Ultrastructurally, the Golgi was nearly completely deficient in trans-Golgi vacuole formation. Endogenous triglyceride particles could not be found and the circum-Golgi smooth endoplasmic reticulum was absent. When the infant was fed a medium-chain triglyceride diet, steatorrhea improved and the liver cell cytoplasmic fat droplets became smaller and less numerous. During the 14 months of medium-chain triglyceride feedings, however, there was progression of the initially mild hepatic fibrosis to an advanced micronodular cirrhosis, and alcoholic hyalin appeared in the hepatocytes. It is suggested that the development of alcoholic hyalin may be related to the accumulation of 2-carbon fragments derived from medium-chain triglycerides as a result of defective hepatic triglyceride secretion. Because of the destructive but asymptomatic lesion seen in this infant's liver, liver function should be carefully investigated in all children with abetalipoproteinemia. Diagnostic liver biopsy is indicated if hepatomegaly or chemical signs of liver dysfunction persist, particularly if diet manipulation is contemplated.

6274 BENIGN CHOLESTATIC JAUNDICE OF PREGNANCY AND BENIGN CHOLESTATIC JAUNDICE FROM ORAL CONTRACEPTIVES. *(E.)* Drill, V. A. (G. D. Searle & Co., Skokie, Ill.). *Amer. J. Obstet. Gyn.* 119(2): 165-174, 1974.

In women with benign cholestatic jaundice of pregnancy, there appears to be a metabolic defect such that the increased secretion of estrogen and progesterone during pregnancy results in jaundice. Following delivery, the jaundice disappears, and there is no residual effect on liver function or liver histology. Cholestatic jaundice of pregnancy is not due to destruction of liver cells, but to interference with the secretory process, so that conjugated bilirubin accumulates in the blood stream and produces the jaundice. The administration of oral contraceptives to women with a history of cholestatic jaundice of pregnancy may result in a generalized pruritis or a cholestatic jaundice similar in nature to that which occurs during pregnancy. This jaundice, like that of a pregnancy, is benign, and liver function returns to normal when treatment is discontinued. Pruritis may be a prodromal sign for the development of cholestatic jaundice. In the nulliparous woman, the development of generalized pruritis during the use of oral contraceptives indicates that the patient may develop benign cholestatic jaundice if treatment is continued or if pregnancy occurs.

6275 GAMMA-GLUTAMYL-TRANSPEPTIDASE IN HEPATOBILIARY DISEASE — VALUE AS AN ENZYMATIC LIVER FUNCTION TEST. *(E.)* Cuschieri, A.; Baker, P. R. (Dept. Surg., Univ. Liverpool, England). *Br. J. Exp. Pathol.* 55(2):110-115, 1974.

The diagnostic and prognostic value of serum gamma-glutamyl-transpeptidase activity in hepatobiliary disease was investigated in 52 patients (19-68 yr) and 33 controls (24-56 yr) whose serum bilirubin, alanine-aminotransferase, albumin, and globulin values were normal. Gamma-glutamyl-transpeptidase activity in the controls averaged 14.8 mU/ml, whereas it was elevated in cryptogenic and alcoholic cirrhosis (53.8 mU/ml), chronic active hepatitis (240.6 mU/ml), extrahepatic biliary tract obstruction (156.0 mU/ml), primary biliary cirrhosis (greater than 200 mU/ml), and hepatic neoplasms (greater than 200 mU/ml). In cirrhosis, there was a significant decline in activity as the condition progressed, and very low values were found in terminal hepatic coma. In chronic active hepatitis, there was no significant difference between values observed during relapse and remission. After surgical correction of biliary tract obstruction, the enzyme activity remained elevated for 4-6 weeks, indicating limited use of the test in the early follow-up of patients so treated. Although a high serum level of gamma-glutamyl-transpeptidase activity was thus found to be associated with cholestatic disorders, determination of the level does not appear to contribute materially toward differentiation between biliary and parenchymatous disease.

6276 LONG-TERM INTRAARTERIAL INFUSION IN CHEMOTHERAPY OF LIVER CANCER: PRELIMINARY REPORT.

(Rus.) Klimenko, G. A. (Khar'kov Sci. Res. Inst. Gen. Emergency Surg., USSR). *Klin. Khir.* (7):20-25, 1973.

By means of retrograde percutaneous transfemoral catheterization of the celiac trunk and common hepatic artery, continuous intra-arterial infusions of 5-fluoro-uracil (FU) were administered to 6 patients with primary or secondary liver tumors for periods of 1-3 weeks. The daily dose of FU (10 mg/kg/day) was dissolved in 2000-2500 ml of 5% glucose solution containing insulin (1 U/5 g dry glucose), heparin (5000 U/liter), and other drugs (epinephrine, diphenhydramine hydrochloride, vitamins and, in some cases, procaine). Of these 6 patients, 3 showed subjective and objective responses to FU. These included one patient with a large hepatocellular carcinoma who developed hypoglycemic crises; glucose infusions were no longer required after administration of FU. In another patient with an inoperable adenocarcinoma of the hepatic portal and hepatic metastases, symptoms of obstructive jaundice disappeared after infusion of 10 g FU over a 2-week period. Therapy also reduced serum bilirubin levels and normalized serum transaminase levels, but the patient developed ascites, hypoalbuminemia, and bone marrow depression, possibly because FU leaked into the systemic circulation due to difficulty in positioning the catheter. Pain was alleviated in a 3rd patient with cancer of the papilla of Vater and hepatic metastases. The unsatisfactory effect of therapy in the other 3 patients may have been due to progressive disturbances in liver function, growth of the primary tumor, and administration of inadequate doses of FU, but these patients were poor candidates for chemotherapy in the first place. They consisted of a patient with a pancreatic carcinoma which had invaded the liver, a patient with a primary liver tumor involving both lobes, and one with a tumor of the head of the pancreas and multiple hepatic metastases.

6277 KINETICS OF RADIOACTIVE COPPER IN WILSON'S DISEASE.

(Ger.) Willvonseder, R.; Goldstein, N. P.; Tauxe, W. N. (Mayo Clin., Rochester, Minn.). *Wien. Z. Inn. Med.* 54(5/6):226-233, 1973.

Plasma incorporation, hepatic uptake, urinary and fecal excretion, and whole-body retention of ^{64}Cu or ^{67}Cu were investigated in 36 homozygous carriers of the gene for Wilson's disease, 24 of their heterozygous parents, and 28 normal controls. The diagnosis of Wilson's disease was confirmed either by the finding of Kayser-Fleischer rings or a pathological decrease in serum ceruloplasmin associated with typical neurological symptoms and liver disease. Plasma radioactivity decreased during the first hr after i.v. injection of ^{64}Cu or ^{67}Cu in normal controls and heterozygotes, after which the radioactivity increased. Although heterozygotes incorporated less Cu in their plasma than controls, the shape of incorporation curves for both of these groups was similar. In contrast, practically no plasma incorporation of Cu occurred in untreated homozygotes with manifest Wilson's disease, and plasma radioactivity progressively decreased. Liver scans revealed that 50% of the injected Cu was present in the liver of controls 55 min after injection. Within 3 days both controls and heterozygotes had catabolized some of this copper. Hepatic uptake of Cu progressively increased in homozygotes and reached extremely high values in patients with presymptomatic Wilson's disease. Although little or no Cu was excreted in the urine of most of the subjects studied, fecal excretion increased progressively in normal subjects and was lower in heterozygotes than in controls. The lowest values for fecal excretion were obtained in patients with presymptomatic Wilson's disease. Untreated homozygotes with manifest Wilson's disease excreted more Cu in the urine than any of the other groups, but little or no Cu was found in their stools. Whole-body retention differed significantly between homozygotes, heterozygotes, and controls. With ^{64}Cu the mean biological half-lives were 97.0 ± 29.6 days for untreated homozygotes, 29.4 ± 17.0 days for heterozygotes, and 17.0 ± 3.2 days for controls. These findings indicate that Cu is normally bound to ceruloplasmin in the liver. The liver of patients with Wilson's disease is unable to incorporate Cu into ceruloplasmin so that unbound Cu accumulates in the liver. The Cu-uptake mechanism, which is present in the normal liver, becomes decompensated in manifest Wilson's disease, and Cu overflows into the urine and the tissues.

6278 FANCONI'S DISEASE AND LIVER CANCER.

(Fr.) Cattan, D.; Kalifat, R.; Wautier, J. L.; Meignan, S.; Vesin, P.; Piet, R. (Nouvel Hosp., Villeneuve-Saint Georges, France). *Arch. Fr. Mal. App. Dig.* 63(1):41-48, 1974.

Fanconi's disease was diagnosed in an 8-yr-old girl who had pancytopenia associated with congenital anomalies (growth retardation, microcephalia, skin pigmentation, bilateral syndactylia of the lower extremities, and left renal atrophy). The patient was splenectomized when she was 9 yr old and was treated by transfusions; no androgens were ever administered. At the age of 23 yr the patient was hospitalized with hepatomegaly and a positive α-fetoprotein test. Laparoscopy revealed cirrhosis with polychromatic masses and multiple whitish nodules over the entire surface of the liver and signs of portal hypertension. Many cold spots were detected in the liver by Tc scanning. These spots filled up during scanning with selenomethionine. Hemorrhagic ascites and a hemorrhagic pleural effusion developed on the 15th day of hospitalization and rapidly reappeared after paracentesis. The patient died 2 months after admission. Autopsy showed a hepatoma with some areas of cholangiomatous differentiation which developed in association with micro- and macronodular cirrhosis and hemochromatosis, intrahepatic cholestasis, and bile production by the tumor. Multiple metastases were detected in the lungs, pleura, lymphatics, and mediastinal lymph nodes. These metastases also produced bile. The kidneys also contained many bile deposits in the epithelium of the excretory tubules. A duodenal ulcer had perforated and penetrated the head of the pancreas. This is the 5th reported case of Fanconi's disease associated with liver cancer in the literature. This case casts doubt on the hypothesis that the liver cancer is caused by androgen therapy. It is suggested that a genetically transmitted susceptibility to cancer might be present in patients with Fanconi's disease and their families.

6279 PRIMARY CARCINOMA OF THE LIVER. *(E.)* Honjo, I.; Mizumoto, R. (Kyoto Univ. Med. Sch., Japan). *Am. J. Surg.* 128(1):31-36, 1974.

Hepatic resection for carcinoma of the liver has only rather recently been established as a standardized surgical procedure, and this report analyzes the overall handling (including resection) of 76 patients with histologically proven primary cancer of the liver over a 22-yr period. Seventy-one of the patients were adults (27-75 yr old) and 5 were infants and children (5.5 months to 13 yr); the ratio of males to females was 3.4:1. Of the 76 patients, 57 had hepatocellular carcinoma, 15 cholangiocellular carcinoma, and 4 showed a mixed type. Surgical exploration on 71 patients included hepatic resection in 23 (32%), ligation of the portal branch in 8, ligation of the hepatic artery in 7, and exploratory laparotomy alone in 33 cases. Diagnosis in the remaining 5 of the 76 patients was established by autopsy or percutaneous needle biopsy. Cirrhosis of the liver was clearly evident in 28 of the 57 patients with hepatocellular carcinoma. Of 10 cirrhosis patients who underwent hepatic resection, 2 died from hepatic coma within 2 months; 2 showed a delayed recovery of liver function after hepatic lobectomy; and the remaining 6 patients survived with no remarkable changes after segmental resection of procedures of lesser magnitude. One of them was well for 17 yr and 5 months after lateral segmentectomy until he was killed in a traffic accident. Operative mortality in all patients who underwent hepatic resection was 9%, and the survival rates were 43% for 1 yr, 22% for 3 yr, and 13% for 5 yr. For patients with nonresectable cancer, ligation of one of the main portal branches supplying the main tumor resulted in some improvement of their prognosis. Thus, this more aggressive approach to surgical treatment of liver tumors, hepatic resection, promises a greater chance for success.

6280 LIVER FUNCTION AND HISTOLOGY IN ASYMPTOMATIC CHINESE MILITARY PERSONNEL WITH HEPATITIS B ANTIGENEMIA. *(E.)* Anderson, K. E.; Sun, S. C.; Berg, H. S.; Chang, N. K. (U.S. Navel Med. Res. Unit No. 2, Taipei, Taiwan). *Am. J. Dig. Dis.* 19(8):693-703, 1974.

A 1-year survey of 1433 apparently healthy Chinese military personnel (91% aged 15-25 yr) showed a high prevalence (12.7%) of hepatitis B antigen similar to other Taiwan studies. The reasons for this widespread prevalence are unknown, but maternal-fetal transmission, frequent injections, and poor sanitation may be partly responsible. There was a statistically significant association between antigen presence and SGOT elevation. Of 44 men (aged 20-21 yr) selected for detailed study of the liver function and histology, 5 had symptoms suggestive of viral hepatitis; in 4, these had occurred 1-5 yr previously but the 5th subject still had acute as well as chronic symptoms. Mild SGOT elevation was present in 13 cases and in 17 BSP retention exceeded 5% at 45 min; a significant relation between SGOT increase and abnormal BSP retention was observed. Liver biopsies demonstrated portal tract inflammation and expansion; lobular histopathology (including cell swelling, focal inflammation, and necrosis); and eosinophilic bodies, although these changes were often mild and nonspecific. Cirrhosis was not found in any case. Histologically the 44 cases were classified as chronic aggressive hepatitis (1), chronic persistent hepatitis (9), lobular hepatitis (9), nonspecific changes (22), and normal (3). These results indicate that the majority of young Chinese men with asymptomatic hepatitis B antigenemia do not have severe chronic liver disease; however, follow-up studies over several years will be required to determine accurate long-term prognoses in these carriers.

6281 HEPATIC CHANGES AFTER SMALL-INTESTINAL BYPASS FOR MORBID OBESITY. *(E.)* Kern, W. H.; Payne, J. H.; Dewind, L. T. (Hosp. Good Samaritan, Los Angeles, Calif.). *Am. J. Clin. Pathol.* 61(6):763-768, 1974.

Liver biopsies obtained from 30 patients during intestinal bypass procedures for morbid obesity were compared with biopsies taken up to 133 months after the shunt. Fatty change, expressed as the percentage of cells containing fatty cytoplasmic vacuoles, and the presence of inflammation and fibrosis were noted. All but 2 of the 30 patients had some evidence of fatty metamorphosis in the 1st biopsy specimen. In the 8 patients (women, aged 20-43 yr) who underwent jejunocolic shunts and in 10 of the 22 (4 men and 18 women, aged 23-48 yr) with jejunoileal shunts, fatty changes were more severe in the 2nd biopsy specimen. Of the 10 jejunoileal shunt patients with more severe changes, 5 were biopsied 18 months or sooner after surgery and 5 following weight stabilization (2 yr or later). In 8 other patients rebiopsied after weight stabilization, hepatic parenchymal changes remained the same in 2 and improved in 6. A significant decrease in fatty change was observed in the 3 patients who had 3rd biopsies 12-15 months later. The extent of inflammatory change did not differ significantly between groups, but 13 patients (11 with jejunoileal shunts and 2 with jejunocolic shunts) had a slightly greater periportal fibrosis at time of the 2nd biopsy. None of these patients developed cirrhosis.

6282 LIVER STUDIES IN THE THOROTRAST PATIENTS—LABORATORY AND CLINICAL FINDINGS (STUDY OF 175 CASES). *(E.)* Tavares, M. H.; Saragoca, A.; da Silva Horta, J. (Univ. Lisbon, Fac. Med., Portugal). *Proc. 3rd Int. Meeting Toxicity Thorotrast* 294:212-218, 1973.

This study on effects of Thorotrast utilized records of laboratory tests and clinical studies on the liver since systemic injection of this drug results in deposits in the reticuloendothelium system. Data from 175 unselected patients (86 men and 89 women, aged 22-87 yr) injected with thorium dioxide 10-41 yr earlier were analyzed. Doses of Thorotrast ranged from 4-70 ml, but were unknown in 19 cases. Clinical complaints were most often related to gastrointestinal pathology, mainly the liver. Laboratory tests disclosed serum dysproteinemias: low albumin (70.9% incidence); increased α-2-globulin (69.3%); and increased γ-globulin (71.1%); as well as increased levels of blood alkaline phosphatase (70.1%). The α-fetoprotein levels were negative in all 10 cases in which it was possible to perform this test. Among the 25 cases with histological liver examination, 11 liver tumors were found: 4 hemangioendotheliomas, 5 cholangiocarcinomas, and 2 adenocarcinomas. The remaining 14 cases disclosed hepatic fibrosis. The liver tumors appeared only in patients with 25 or more yr since injection.

6283 INTRAHEPATIC HEMATOMA: A COMPLICATION OF PERCUTANEOUS LIVER BIOPSY. A REPORT ON THE INCIDENCE OF POSTBIOPSY SCAN DEFECTS. *(E.)*

Raines, D. R.; Van Heertum, R. L.; Johnson, L. F. (Tripler Army Med. Ctr., San Francisco, Calif.). *Gastroenterology* 67(2):284-289, 1974.

An intrahepatic hematoma occurred after percutaneous liver biopsy in a 62-yr-old woman who had possible liver involvement due to chronic alcoholism. A complete blood count and coagulation studies (prothrombin time and partial thromboplastin time) were normal, but liver function tests were abnormal. Ten days after the biopsy, a liver scan showed a large defect laterally on the lobe. Hepatic angiography confirmed the scan lesion and also demonstrated an intrahepatic hemangioma. Peritoneoscopy revealed fresh, dense hemorrhagic adhesions involving the right liver lobe at the site of the previous percutaneous liver biopsy. Serial hepatic scanning and an arteriogram demonstrated complete resolution of the hematoma over a 3-month period. The hemangioma remained unchanged. In a subsequent 7-month prospective study of 40 patients, 3 (7%) had postbiopsy scan defects not present on the prebiopsy scan. To avoid diagnostic confusion and unnecessary diagnostic procedures, liver scans should be obtained prior to percutaneous liver biopsy.

6284 AN ALGORITHM FOR MONITORING AND MANAGING DRUG HEPATOTOXICITY. *(E.)*

Hofmann, A. F.; Thistle, J. L. (Mayo Clin., Rochester, Minn.). *Gastroenterology* 67(2):309-313, 1974.

A systemic schedule for monitoring and managing drug hepatotoxicity is based on SGOT analyses at 2 and 4 weeks. If the SGOT value is increased on 2 occasions a liver biopsy is done and the drug (e.g., chenodexoycholic acid) discontinued if liver damage is confirmed. If there is no damage, the patient will be managed according to monthly SGOT values. If 2 consecutive SGOT values are normal, the drug will be continued and the patient's condition reevaluated at 6-month intervals. Failure of SGOT to return to normal will be an indication for decreasing the drug dose by ½ on 2 occasions. SGOT and alkaline phosphatase are monitored during and after cessation of drug administration, until SGOT values return to normal. The schedule detects both unpredictable hepatotoxic reactions and predictable or more chronic reactions.

6285 HEPATIC LIPID IN REYE'S SYNDROME: HISTOCHEMICAL AND ULTRASTRUCTURAL CHARACTERISTICS. *(E.)*

Brown, R. E.; Johnson, F. B.; Mullick, F. G. (J. C. Blair Mem. Hosp., Huntingdon, England). *Pa. Med.* 77(6):39-41, 1974.

Histochemical and ultrastructural studies were carried out on liver sections from 4 patients with Reye's syndrome in an attempt to characterize the lipid within the parenchymal cells. This lipid was generally distributed throughout the lobule, but occasionally there was noticeably less lipid in periportal hepatocytes. Within cells, lipid droplets were usually small and uniform in appearance, did not displace the hepatocyte nucleus, and did not generally fill the cytoplasm. Their numbers varied from cell to cell within each case. The absence of histochemically demonstrable amounts of glycolipids, phospholipids, free fatty acids, and cholesterol and the absence of cholesterol esters suggested that the accumulated lipid was predominately neutral lipid, probably triglyceride. This is consistent with the results of chromatographic and chemical analyses of hepatic lipids, with studies of blood lipids in Reye's syndrome, which indicated no hyperlipoproteinemia, hypercholesterolemia, or hyperphospholipidemia, and with known physiopathic aspects of the disease. Ultrastructurally, a characteristic of the accumulated lipid droplets was the occasional presence of osmiophilic dense material, possibly lipomicrons, at the interface between droplets and hepatocyte cytoplasm. The results are further evidence for excessive lipolysis with mobilization of fatty acids in Reye's syndrome and thus support the argument for antilipolytic therapy.

6286 BIREFRINGENCE OF HEPATIC PIGMENT DEPOSITS IN ERYTHROPOIETIC PROTOPORPHYRIA. *(E.)*

Klatskin, G.; Bloomer, J. R. (Yale Univ. Sch. Med., New Haven, Conn.). *Gastroenterology* 67(2):294-302, 1974.

Liver specimens from 7 patients with erythropoietic protoporphyria showed that deposits of protoporphyrin characteristic of this condition were crystalline under the electron microscope and exhibited a distinctive type of birefringence not shared by any other hepatic pigments when viewed by the polarization microscope. This birefrigence was readily visible in routine fixed and stained paraffin-embedded sections, and was as sensitive an indicator as red fluorescence. No such protoporphyrin birefringence was seen in 45 control patients whose liver contained bile, hemosiderin, lipofucsin, Dubin-Johnson pigment, melanin, anthrocotic pigment, schistosomal pigment, and Thorotrast. Liver samples from 4 patients with other forms of porphyria which were unaccompanied by hepatic pigment deposits were also studied because 3 of the specimens demonstrated red fluorescence. All 4 were negative for birefrigence. This technique is rapid, highly sensitive, and specific for the identification of hepatic protoporphyrin. In contrast to fluorescence microscopy polarization examination does not require frozen sections or a fluorescence microscope and can be carried out with any standard light microscope fitted with a pair of polarizing filters. When used with routinely fixed and stained paraffin-embedded sections, polarization microscopy permits more precise localization of the protoporphyrin deposits, however minute.

6287 LIVER IRON CONCENTRATION, STAINABLE IRON, AND TOTAL BODY STORAGE IRON. *(E.)* Barry, M. (Roy. Free Hosp., London, England). *Gut* 15(5): 411-415, 1974.

Over a 5 yr period, liver iron concentration was determined chemically in 154 liver biopsies and the findings compared with the routine histological assessment of stainable parenchymal iron, performed by a independent observer. There was a significant correlation between liver iron concentration and histochemical grading but the relationship did not have a normal linear form. Absence of stainable iron corresponded to liver iron concentrations below the mean value for control male subjects (77 μg/100 mg dry liver). In general, grade 1 siderosis corresponded to liver iron concentrations in the upper part of the control range and grade 2 siderosis to marginally elevated values. The transition from grade 2 to grade 3 (submaximal) siderosis represented a sharp increase in liver iron concentration; and as grade 3 siderosis corresponded to a wide range of chemical values, it is also the most difficult histochemical grade to interpret in quantitative terms. Grade 4 siderosis invariably indicated heavy iron excess. There was a close correlation between liver iron concentration and measurements of total body storage iron obtained by quantitative phlebotomy in patients with idiopathic hemochromatosis and by determination of diethylenetriamine pentaacetic acid chelatable body iron in a variety of iron-loading disorders.

288 HEMOLYTIC ANEMIA OF WILSON'S DISEASE. *(E.)* Iser, J. H.; Stevens, B. J.; Stening, G. .; Hurley, T. H.; Smallwood, R. A. (Austin Hosp., ictoria, Australia). *Gastroenterology* 67(2):290-93, 1974.

Case reports are presented of a 27-yr-old woman and a 28-yr-old man with Wilson's disease who were admitted with severe hemolytic anemia and evidence of Liver decompensation. In the 2nd patient, copper studies and severe coagulation abnormalities were consistent with Wilson's disease and prompt slit-amp examination confirmed the presence of Kayser-'leischer rings. Because of the certainty of diagosis and the grossly abnormal coagulation profile, iver biopsy was not performed. The patient was uccessfully treated with penicillamine (1 g/day intially, increased to 2 g/day) and is now symptom ree. The 1st patient, in whom the diagnosis was elayed 2 months, succumbed following a 2nd hemolyic episode during which hemoglobin fell to 6.9 g/100 l and bilirubin rose to 42 mg/100 ml. Subsequent nvestigations showed that each patient had a sibling ith Wilson's disease. In both patients, release f copper into plasma and urine coincided with epiodes of hemolysis. Serum "free" copper in the man as approximately 120 μg/100 ml, several times the evel normally found in Wilson's disease. This increased filterable fraction may have accounted for the high 24-hr urinary excretion (5676 μg). In the woman, a urinary copper level of over 10,000 μg/24 hr during the 2nd hemolytic episode suggested that a large copper flux occurred. In case 2, calculations assuming rapid red cell destruction indicated that copper was probably released from red cells during intravascular hemolysis. This study indicates the importance of early diagnosis of Wilson's disease when severe hemolysis and hepatic decompensation occur together.

6289 CLEARANCE OF ANTIPYRINE-DEPENDENCE OF QUANTITATIVE LIVER FUNCTION. *(E.)* Andreasen, P. B.; Ranek, L.; Statland, B. E.; Tgystrup, N. (Univ. Hosp., Copenhagen, Denmark). *Eur. J. Clin. Invest.* 4(2):129-134, 1974.

Plasma clearance of antipyrine (100 mg/ml i.v. for 5 min) was determined in 13 patients (aged 22-75 yr) with liver disease, and compared with the results of other quantitative liver function tests. Nine patients (aged 26-59) without liver disease served as controls. Diagnosis in the 13 patients was alcoholic cirrhosis (5), idiopathic cirrhosis (5), primary biliary cirrhosis (2), halothane hepatitis (1), and extrahepatic biliary obstruction (1). Clearance of antipyrine was significantly lower in patients with liver disease than in controls (18.5 and 58.6 ml/min, resp.). Among patients with liver disease, 7 with severely reduced capacity for work had significantly lower clearance of antipyrine than nonincapacitated patients (12.5 and 25.4 ml/min, resp.). Antipyrine clearance was significantly correlated with galactose elimination capacity, serum albumin values, and prothrombin values. The results indicate that the drug-metabolizing capacity of the liver changes in parallel with other metabolic functions. Therefore, the clearance of antipyrine may be a useful quantitative test of liver function.

6290 ELECTRON MICROSCOPE STUDIES ON LIVER CHANGES IN NEWBORNS AFTER ENZYME INDUCTION. *(Ger.)* Hinkel, G. K.; Kemmer, C. (Carl Gustav Carus Med. Acad., Dresden, Germany). *Paediatr. Grenzgeb.* 12(3):201-213, 1973.

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6334 BILIARY PERITONITIS RESULTING FROM PERFORATION OF AN INTRAHEPATIC BILE DUCT. *(Rus.)* Fikhman, I. I. (Odessa Munic. Hosp. No. 3, USSR). *Klin. Khir.* (6):79-80, 1973.

6335 OBSTRUCTIVE JAUNDICE CAUSED BY HEPATIC ECHINOCOCCOSIS. *(It.)* Saitta, E.; Cavallaro, G. (Inst. Surg. Symptomatol., Univ. Messina, Italy). *Chir. Gastroenterol.* 7(3):306-315, 1973.

6336 HEPATIC HAMARTOMA: RIGHT HEMIHEPATECTOMY. *(Sp.)* Rodriguez Alvarez, J. L.; Martinez Molina, E. (Puerta de Hierro Clin., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 43(2):201-212, 1974.

6337 BILIARY-BRONCHIAL FISTULAS IN HEPATIC ECHINOCOCCOSIS. *(Rus.)* Nazarevskii, N. G. (Crimean Med. Inst., Simferopol, USSR). *Klin. Khir.* (5):9-12, 1973.

6338 ANGIOGRAPHIC INVESTIGATION OF THE BUDD-CHIARI SYNDROME. *(Ger.)* Renner, M.; Schof, J.; Bottger, E.; Hartmann, R. (Radiol. Inst., Univ. Heidelberg, Germany). *Fortschr. Geb Roentgenstr. Nuklearmed.* 120(5):541-545, 1974.

6339 HEPATIC INVOLVEMENT IN HODGKIN'S DISEASE. *(Fr.)* Hoerni, B.; Leleu, J. P.; Durand, M.; Chauvergne, J. (Bergonie Fdn., Bordeaux, France). *Med. Chir. Dig.* 2(6):333-336, 1973.

6340 SOLITARY LIVER ABSCESS AS A COMPLICATION OF SIGMOID DIVERTICULITIS. *(E.)* Kaiser, C. W.; Buerk, C. A.; Curtis, L. E.; Hoye, S. J. (Tufts Univ. Sch. Med., Boston, Mass.). *Am. Surg.* 40(7):421-424, 1974.

6341 REYE'S SYNDROME. *(E.)* Kumari, S. (no affil.). *J. La. State Med. Soc.* 126(5):155-159, 1974.

6342 FOLLOWUP OF THOROTRAST PATIENTS FROM BOSTON, MASSACHUSETTS AND ANN ARBOR, MICHIGAN, USA. *(E.)* Janower, M. L. (St. Vincent Hosp., Worcester, Mass.). *Proc. Int. Meeting Toxicity Thorotrast, 3rd, Copenhagen, Denmark, 1973.* pages 126-136.

6343 ACTUAL STATUS OF THE GERMAN THOROTRAST STUDY. *(E.)* van Kaich, G.; Scheer, K. E. (German Cancer Res. Ctr., Heidelberg, Germany). *Proc. Int. Meeting Toxicity Thorotrast, 3rd, Copenhagen, Denmark, 1973.* pages 157-162.

6344 SPECIAL CLINICAL FINDINGS AMONG THOROTRAST PATIENTS. *(E.)* van Kaick, G.; Lorenz, D.; Drings, I. (German Cancer Res. Ctr., Heidelberg, Germany). *Proc. Int. Meeting Toxicity Thorotrast, 3rd, Copenhagen, Denmark, 1973.* pages 163-168.

6345 THOROTRAST INJURY IN JAPAN. *(E.)* Mori, T.; Nozue, Y.; Miyazi, T.; Takahashi, S. (Yokohama City Univ. Sch. Med., Japan). *Proc. Int. Meeting Toxicity Thorotrast, 3rd, Copenhagen, Denmark, 1973.* pages 175-192.

6346 PATHOLOGICAL FINDINGS IN THE RES (LIVER, SPLEEN, LYMPH NODES, BONE MARROW) OF THOROTRAST PATIENTS (HISTOLOGICAL AND AUTORADIOGRAPHIC INVESTIGATIONS). *(E.)* Wegener, K.; Wesch, H.; Kampmann, H.; Zahnert, R. (Inst. Pathol., Univ. Heidelberg, Germany). *Proc. Int. Meeting Toxicity Thorotrast, 3rd, Copenhagen, Denmark, 1973.* pages 248-267.

6347 THOROTRAST-INDUCED SPINDLE CELL SARCOMA AND HEPATIC CHOLANGIOCARCINOMA IN SYRIAN HAMSTERS. *(E.)* Mori, T.; Okamoto, T.; Umeda, M.; Saito, K.; Okanzima, H. (Yokohama City Univ. Sch. Med., Japan). *Proc. Int. Meeting Toxicity Thorotrast, 3rd, Copenhagen, Denmark, 1973.* pages 267-280.

6348 DOSE EFFECT RELATIONS IN HEPATIC CARCINOGENESIS. *(E.)* Faber, M. (Finsen Inst., Copenhagen, Denmark). *Proc. Int. Meeting Toxicity Thorotrast, 3rd, Copenhagen, Denmark, 1973.* pages 308-316.

See also, 5846, 5973, 5991, 5993, 5996, 5999, 6000, 6013, 6015, 6023, 6026, 6033, 6095, 6250, 6401, 6406, 6408, 6416, 6420, 6464, 6503.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

6349 PLASMA GLUTAMATE DEHYDROGENASE ACTIVITY IN SOME HEPATOGENIC AND HEMOLYTIC FORMS OF JAUNDICE IN NEWBORNS. *(Rus.)* Dobronravov, A. V.. (Leningrad Pediatr. Med. Inst., USSR). *Vopr. Okhr. Materin. Det.* 18(9):32-35, 1973.

6350 PHENOBARBITAL IN THE DRUG TREATMENT OF NEONATAL JAUNDICE. (LITERATURE REVIEW). *(Rus.)* Skakun, N. P.; Oleinik, A. N.; Skakun, G. K.; Dannik, L. M. (Tarnopol Med. Inst., USSR). *Vorp. Okhr. Materin. Det.* 18(9):36-38, 1973.

6351 DUBIN-JOHNSON SYNDROME (CHRONIC IDIOPATHIC JAUNDICE). *(E.)* Bajaj, R. T.; Desai, M. (Bai Jerbai Wadia Hosp. Child., Bombay, India). *Indian Pediatr.* 11(1):75-78, 1974.

6352 UNCONJUGATED HYPERBILIRUBINEMIA RESULTING FROM METABOLIC DISORDERS IN CHILDREN. *(It.)* Murano, G. (1st Fac. Med. Surg., Univ. Naples, Italy). *Fase. Clin. Sci.* 49(4/5):125-132, 1973.

See also, 5865.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

6353 LIVER FUNCTION IN WORKERS HAVING HIGH TISSUE STORES OF CHLORINATED HYDROCARBON PESTICIDES. *(E.)* Morgan, D. P.; Roan, C. C. (Inst. Agr. Med., Univ. Iowa, Oakdale). *Arch. Environ. Health* 29(1):14-17, 1974.

Liver cell injury and induction of drug-metabolizing enzymes due to exposure to chlorinated hydrocarbon pesticides were checked in 28 men working from 5 to 22 yr in the formulation or application of agricultural chemicals and showing high tissue stores of DDT and its metabolites (up to 660 ppb DDT + DDE serum concentration), and in 43 workers engaged principally in termite control and showing exceptional blood levels of dieldrin (up to 313 ppb) due to cumulative absorption over several years. Controls were 56 male subjects with no more than ordinary household exposure to pesticides (DDT 4, DDE 52, and dieldrin 0.3 ppb in serum). The use of serum concentrations of DDT and dieldrin to reflect tissue storage has empirical support. Five serum enzyme activities (SGOT, SGPT, LDH, alkaline phosphatase, and creatine phosphokinase) were measured to gauge liver cell damage; urinary excretion of D-glucaric acid was observed to determine possible induction effects. Statistical comparisons of means for pesticide-exposed subjects with control means revealed substantial and significant differences in all three serum pesticide concentrations, but no significant differences in serum enzyme activity tests or D-glucaric acid excretion between exposed and nonexposed groups. Neither the serum enzymes nor the D-glucaric acid excretion were significantly correlated with the concentrations of pesticides in the serum. The results obtained here show no evidence that high tissue stores of DDT, DDE, or dieldrin damage liver cells, or stimulate the hepatic synthesis of D-glucaric acid.

6354 HEPATIC INJURY ASSOCIATED WITH PENICILLIN THERAPY. *(E.)* Goldstein, L. I.; Ishak, K. G. (Armed Forces Inst. Pathol., Washington, D.C.). *Arch. Pathol.* 98(2):114-117, 1974.

A 42-yr-old man was given phenoxymethyl penicillin (250 mg 4 times/day) after presenting with joint pains of 3 days' duration. After 8 days of treatment, the patient developed a syndrome resembling serum sickness, with fever, leukocytosis, and arthralgias of the knees, ankles, and small joints of the hand. The only biochemical abnormality reflecting hepatic injury was increased serum alkaline phosphatase activity (80-96 U). The hepatic origin of the rise in serum alkaline phosphatase was established by starch gel electrophoresis and determinations of leucine aminopeptidase (70 mμ/ml) and 5'-nucleotidase (10.5 U). Light microscopy of sections from the percutaneous hepatic biopsy specimen showed minimal accumulation of bile pigment in ventrilobular hepatocytes together with slight parenchymal injury. Electron microscopy delineated the site of injury as mainly canalicular and pericanalicular. The injury was predominantly that of intrahepatic cholestasis, but was not reflected by jaundice or hyperbilirubinemia.

6355 ANDROGENIC FUNCTION OF THE ADRENAL CORTEX IN PATIENTS WITH CHRONIC CHOLANGITIC HEPATITIS. *(Rus.)* Glibka, A. Z. (Chernovtsy Med. Inst., USSR). *Vrach. Delo* (5):74-76, 1974.

6356 BIOCHEMICAL BASIS FOR DRUG-INDUCED HEPATOTOXICITY. *(E.)* Mitchell, J. R.; Jollow, D. J. (Natl. Inst. Hlth., Bethesda, Md.). *Isr. J. Med. Sci.* 10(4):312-318, 1974.

6357 PHARMACOGENETIC FACTORS AS DETERMINANTS OF HEPATOTOXICITY. *(E.)* Vesell, E. S. (Milton S. Hershey Med. Ctr., Hersey, Pa.). *Isr. J. Med. Sci.* 10(4):334-338, 1974.

6358 Senecio AND OTHER PLANTS AS LIVER POISONS. *(E.)* McLean, E. K. (Maudsley Hosp., London, England). *Isr. J. Med. Sci.* 10(4):436-440, 1974.

6359 HALOTHANE-ASSOCIATED HEPATITIS: A DISEASE OF MEDICAL PROGRESS. *(E.)* Conn, H. O. (VA Hosp., West Haven, Conn.). *Isr. J. Med. Sci.* 10(4):404-415, 1974.

6360 THE FARISCH-HERXHEIMER REACTION IN SYPHILITIC HEPATITIS. *(E.)* Young, E.; Bahr, G.; Waye, J. D. (14 E. 82nd St., New York, N. Y.). *Am. J. Gastroenterol.* 61(6):476-477, 1974.

6361 FIBRINOLYTIC POTENTIAL OF THE BLOOD IN LIVER DAMAGE. *(Ger.)* Kotschy, M. (Med. Acad., Wroclaw, Poland). *Folia Haematol. (Leipz.)* 101(1):142-152, 1974.

6362 ABNORMALITY IN HEPATIC LIPIDS OF A PATIENT HAVING TAKEN CORALGIL, [HEXESTROL BIS (β-DIETHYLAMINOETHYL ETHER)] FOR A LONG PERIOD. *(E.)* Taketomi, T.; Hayashi, M.; Kawamura, N.; Ichikawa, R. (Inst. Adaptation Med., Matsumoto, Japan). *Jap. J. Exp. Med.* 41(2):133-143, 1974.

6363 GRANULOMATOUS HEPATITIS IN Q FEVER. *(Fr.)* Bouzakoura, C.; Cox, J. N. (Dept. Pathol., Univ. Geneva, Switzerland). *Schweiz. Med. Wochenschr.* 104(22):796-800, 1974.

See also, 5901, 6330.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

6364 ACTIVITY OF COBALT-ACTIVATED SERUM ACYLASE IN VIRAL HEPATITIS. *(Pol.)* Fojt, E.; Gabrys, A.; Fojt, E. (Silesian Acad. Med., Katowice, Poland). *Pol. Tyg. Lek.* 28(52):2043-2045, 1973.

Cobalt-activated acylase activity was determined in sera of 47 patients with viral hepatitis (group I), 12 with other hepatobiliary diseases (group II), and 4 with other diseases (neoplasms of the colon and pancreas, mumps, and pancreatitis) (group III). A significant rise in activity was noted in group I, especially during the first stages of the disease. In 83% of patients of this group, enzyme activity exceeded 0.7 U; values varied between 0-12.8 U with an arithmetic mean of 3.3 ± 2.7 U. In group II activity exceeded 0.7 U in only 42% of patients, never exceeded 1.6 U, and the arithmetic mean was 0.75 ± 0.6 U. In group III values never exceeded 0.7 U with an arithmetic mean of 0.4 ± 0.3 U. These results suggest that values above 1.6 U are specific for viral hepatitis. A comparison with SGPT activity in these patients indicated that in the early stages of the disease cobalt-activated serum acylase is more specific for viral hepatitis than SGPT activity. It is suggested that determination of cobalt-activated acylase activity be included as a routine test for differential diagnosis of viral hepatitis.

6365 ON THE RARE ayr PHENOTYPE OF HEPATITIS B ANTIGEN. *(E.)* Le Bouvier, G. L.; Bancroft, W. H.; Holland, P. V. (Yale Univ. Sch. Med., New Haven, Conn.). *Intervirology* 1(5/6):405-408, 1973.

The rare, recently identified *ayr* phenotype of hepatitis β antigen was detected in the serum of a carrier in New Guinea. All 3 determinants were apparently present together on the same antigenic particle. The *a* and the *y* determinants reacted as expected, but the behavior of the *r* was unusual. Testing by immunodiffusion or counterelectrophoresis indicated that, in this particular serum, the antigenic particles have unusual *r*-reactive sites which take up certain classes of anti-*r* molecules in such a way as to prevent their interaction with *r* sites on adjacent particles. This is the 12th case of the *ayr* phenotype found in the Far East, the home of the *r* determinant in the *adr* form of the phenotype. Thus, preexistance of the postulated viral *r* gene may be a necessary conditon for appearance of the *ayr* phenotype. The conjunction of *y* and *r* determinants could occur in three principal ways: by *d*→*y* mutation in an hepatitis B virus stain of *adr* genotype; by phenotypic mixing of separate, but simultaneously infecting, *adr* and *ayw* viral genomes; and genetic reassortment, resulting in formation of a 'new' virus of genotype *ayr* in individuals infected, at some time, with both *adr* and *ayw* viruses.

6366 CHANGES IN SERUM FREE FATTY ACID LEVELS IN PATIENTS WITH VIRAL HEPATITIS. *(Pol.)* Tkaczewski, W.; Dworniak, D.; Karasek, E. (Warsaw Acad. Med., Poland). *Pol. Tyg. Lek.* 28(49):1928-1929, 1973.

Serum free fatty acid levels were determined at weekly intervals in 20 patients with viral hepatitis (13 women and 7 men, aged 20-50 yr), and the results were compared to values obtained from 20 healthy controls. During the first 2 weeks of illness, serum free fatty acid levels were increased to 912 ± 221.7 and 676 ± 255.4 μEq/liter resp. compared to control levels of 493 ± 137.8 μEq/liter. The extent of change in serum free fatty acid levels was independent of change in SGPT activity, bilirubin or β-lipoprotein levels, or the thymol turbidity test. Free fatty acid levels returned to normal sooner than the other biochemical parameters studied.

6367 HEPATITIS B-SPECIFIC DNA POLYMERASE ACTIVITY DURING POST-TRANSFUSION HEPATITIS. *(E.)* Kaplan, P. M.; Gerin, J. L.; Alter, H. J. (Rockville Lab. Mol. Anat. Program, Oak Ridge Natl. Lab., Rockville, Md.). *Nature (Lond.)* 249(5459):762-764, 1974.

Plasma samples from patients receiving multiple transfusions after surgery were analyzed for Australia antigen (HB Ag), anti-HB Ag, SGPT, and HB Ag-specific DNA polymerase activity. In a group of 3 patients tested, 1 patient developed posttransfusion type B hepatitis after receiving 19 units (500 ml each) of whole blood, 1 unit of which was positive for HB Ag by radioimmunoassay but negative by counterelectrophoresis. In this patient the first sign of infection was detected by a rise in HB Ag on day 25 after transfusion. On day 32, DNA polymerase activity was detected in serum which was concentrated 10-fold and in unconcentrated serum on day 39. SGPT elevation began on day 60. Peaks were reached on day 46 for polymerase, on day 58 for HB Ag, and on day 72 for SGPT. HB Ag and polymerase activity had normalized by day 185, while SGPT was still slightly elevated at this time. In another group of 11 patients, 7 of the 9 who developed posttransfusion hepatitis B (as indicated by the presence of HB Ag and elevated SGPT) had detectable plasma DNA polymerase activity during acute infection. In all cases, the elevated polymerase appeared slightly after the first detection of HB Ag, but preceded signs of liver damage as measured by raised SGPT levels. No polymerase activity was found in a patient with HB Ag-negative posttransfusion hepatitis or in 4 controls, and none of these 5 developed anti-HB Ag. However, nonspecific polymerase activity was exhibited by 1 of the controls as well as by 1 of 2 patients with HB Ag-positive posttransfusion hepatitis considered negative for DNA polymerase. These results show that in most cases HB Ag-specific DNA polymerase activity can be detected in plasma from acutely infected individuals. Peak levels of such activity were higher in acutely infected individuals than in most carriers. The transient nature of enzyme-containing Dane particles in blood and the time at which peak activity was found resembles viremias associated with other viral diseases. These data support the hypothesis that the Dane particle is the virus of hepatitis B. If this is true, then the actual titer of infectious virus in an HB Ag-positive serum may correlate better with the level of specific DNA polymerase than with the titer of HB Ag.

6368 α-FETOPROTEIN IN VIRAL HEPATITIS IN CHILDREN.

(Rus.) Silishcheva, N. N. (Astrakhan Med. Inst., USSR). *Pediatriia* (5):18-21, 1973.

By using a modification of Ochterlony's double diffusion technique, α-fetoprotein (AFP) was determined in serum for 598 children, aged 3 months to 15 yr, with viral hepatitis. Among the 562 children over 1 yr old, only an 8-yr-old boy with protracted hepatitis associated with hemorrhagic diathesis had a positive test for AFP. This test remained positive for 3 1/2 months. In contrast, AFP was detected in sera from 16 of the 36 infants 1 yr old or less. Of these 16 children, 10 had severe hepatitis with marked changes in liver function. Three infants became precomatose and 1 of the 3 fell into an hepatic coma and died. However, of the 5 infants who died, only 2 were able to produce AFP and 1 was found to have cirrhosis with marked regenerative changes at autopsy. In general, AFP appeared in the serum during the acute period when patients began to improve, i.e., at the onset of parenchymal regeneration. It is suggested that AFP determinations might have prognostic value in infants in this age group. In all but 3 patients AFP was still present in the serum after jaundice had disappeared and all clinical and biochemical parameters had normalized. In some patients AFP did not appear until 9-14 weeks after onset of symptoms; most of these patients were premature, had contracted hepatitis during the first 3 months of life, or had severe forms of the infection. No correlation was found between changes in AFP and the results of liver function tests. It is possible that with more sensitive techniques, such as immunoautoradiography, low titers of AFP might have been detected in serum from the remaining infants under 1 yr old.

6369 CHANGES IN SERUM LIPOPROTEINS AND LIPIDS IN HEPATITIS.

(Ger.) Schmitz, J.; Kahlke, W. (Med. Clin., Univ. Heidelberg, Germany). *Dtsch. Med. Wochenschr.* 98(51):2436-2439, 1973.

Serum triglyceride levels were abnormally elevated to values above 200 mg/100 ml 1-10 days after hospitalization of 45 patients with a confirmed diagnosis of acute viral hepatitis. These values had normalized before discharge (days 21-45) in 29 patients but remained elevated in 5. Serum cholesterol levels of less than 250 mg/100 ml were found in 37 patients at admission. At discharge 14 had elevated cholesterol values and 13 had values below 250 mg/100 ml. α-Lipoproteins were absent or present only in very low concentrations during the acute stage of hepatitis. No pre-β-lipoproteins were detected in most patients; 12 had reduced levels and 5, normal levels. Serum triglyceride values were elevated in 7 of the 12 patients with only low concentrations of pre-β-lipoproteins. In cases in which no pre-β-lipoprotein band was found on electrophoresis, a broader than normal β-lipoprotein band was present. Ultracentrifugation of this band showed that it consisted of 2 fractions: one with a very low density (< 1.006) and another with a low density (1.006-1.063). Thus, the pre-β-lipoprotein band did not disappear, but its electrophoretic mobility was reduced and it migrated in the β-lipoprotein region. The atypical lipoprotein pattern gradually normalized in all patients, including the 4 who had elevated serum triglyceride levels at both admission and discharge and who could have had IV hyperlipoproteinemia.

6370 HEPATITIS B ANTIGEN: NEW TECHNICS FOR THE REDUCTION OF POSTTRANSFUSION HEPATITIS.

(E.) Gitnick, G. L.; Koretz, R. L. (Univ. California., Los Angeles). *Am. J. Gastroenterol.* 61(5):366-370, 1974.

Two recently developed methods for detection of hepatitis B antigen (HB Ag), red cell agglutination and radioimmunoassay, were compared with counterelectrophoresis in an attempt to find a more sensitive technique for identification of HB Ag and thus, possibly prevent posttransfusion hepatitis. During a 7-month period, all units of blood used for transfusion were first tested for HB Ag by the counterelectrophoresis method, and only negative samples were transfused. Two weeks later, 6400 units of this stored negative blood were re-screened for HB Ag by red cell agglutination and by radioimmunoassay. A total of 138 units (2.2%) was found to be positive for HB Ag: 106 (1.1%) by the 1st method alone: 8 (0.1%) by the 2nd method alone; and 24 (0.4%) by both assays. Over a 9 month follow-up period, 70 patients (40 males and 30 females, aged 15-85 yr) who received HB Ag-positive blood were checked for levels of SGPT, bilirubin, HB Ag, and hepatitis B antibody (HB Ab) at 2 week intervals. Hepatitis developed in 27 of the 70 subjects (39%), and 6 others had positive tests for HB Ab. Of the 17 patients who received red cell agglutination-positive blood, 16 (94%) developed hepatitis, antibody conversion, or an HB Ag carier state, while only 20 of the 53 recipients (38%) of radioimmunoassay-positive blood showed evidence of exposure to hepatitis B. Of the 19 controls (matched for age, race, and sex) who received HB Ag-negative blood, as tested by red cell agglutination and radioimmunoassay, 9 developed hepatitis and 1 HB Ab. These results revealed that counterelectrophoresis gives a significant percentage of false-negative reactions for HB Ag-positive blood. Of the 2 newer methods, radioimmunoassay is more sensitive test than counterelectrophoresis for HB Ag, but the red cell agglutination technique correlates more closely with disease transmission.

6371 STUDIES OF HUMAN UROBILINOID METABOLISM. II. DETERMINATION OF UROBILINOID CONCENTRATION OF HUMAN SERUM AND URINE AT ACUTE VIRAL HEPATITIS. *(E.)* Schmidt, M.; Puttkammer, G.; Eisenburg, J.; Stich, W. (Dept. Intern. Med., Ludwig Maximilian Univ., Munich, Germany). *Acta Hepatogastroenterol.* 21(2):134-138, 1974.

6372 LIVER DISEASE IN HEALTHY BLOOD DONORS ASSOCIATED WITH PRESENCE OF HEPATITIS B ANTIBODY. *(E.)* Boyes, B. E.; Woolf, I. L.; Whittaker, J. S.; Tapp, E.; Jones, D. M.; Renton, P. H.; Stratton, F.; McSween, R.; Dymock, I. W. (Univ. Hosp. South Manchester, England). *Gut* 15(4):341, 1974.

6373 SEROLOGICAL FINDINGS AMONGST DOMESTIC CONTACTS OF PERSONS WITH TRANSIENT AND PERSISTENT HEPATITIS B ANTIGENAEMIA. *(E.)* Gateau, P.; Heathcote, J.; Sherlock, S. (Royal Free Hosp., London, England). *Gut* 15(4):341, 1974.

6374 GUANINE AND ADENOSINE DEAMINASE ACTIVITIES IN BLOOD SERUM IN THE COURSE OF VIRAL HEPATITIS. *(Pol.)* Boron, P.; Kucharski, C.; Prokopowicz, D.; Kossakowski, R. (Med. Acad., Bialystok, Poland). *Przegl. Lek.* 30(2):277-279, 1973.

6375 EMBRYONIC SERUM PROTEIN, α-FETOPROTEIN AND VIRAL HEPATITIS IN CHILDREN. *(Rus.)* Strutsovskaia, A. L.; Reizis, A. R.; Biriulina, G. I.; Elgort, D. A. (M. V. Vladimirskii Clin. Res. Inst., Moscow, USSR). *Vopr. Okhr. Materin. Det.* 18(9):9-12, 1973.

6376 FREQUENCY OF DETECTION OF THE AUSTRALIAN ANTIGEN AT VARIOUS PHASES OF VIRAL HEPATITIS IN CHILDREN. *(Rus.)* Golzand, I. V.; Blagoslovensky, G. S. (Leningrad Res. Inst. Pediatr. Infection, USSR). *Vopr. Okhr. Materin. Det.* 18(9):12-15, 1973.

6377 ANTIBODY TO HEPATITIS B ANTIGEN IN HAEMOPHILIACS AND THEIR HOUSEHOLD CONTACTS. *(E.)* Burrell, C. J.; Parker, A. C.; Ramsay, D. M.; Proudfoot, E. (Edinburgh Univ. Med. Sch., Scotland). *J. Clin. Pathol.* 27(4):323-325, 1974.

6378 IMMUNOGLOBULINS IN CHILDREN WITH INFECTIOUS AND SERUM HEPATITIS. *(Rus.)* Kupkina, G. K. (Central Inst. Postgrad. Med., Moscow, USSR). *Vopr. Okhr. Materin. Det.* 18(9):15-18, 1973.

6379 A STUDY OF HEPATIC HEMODYNAMICS BY RHEOHEPATOGRAPHY IN CHILDREN WITH VIRAL HEPATITIS. *(Rus.)* Pisarev, A. G. (2nd Moscow Med. Inst., USSR). *Vopr. Okhr. Materin. Det.* 18(9):19-24, 1973.

6380 TOXIC DYSTROPHY OF THE LIVER IN CHILDREN WITH VIRAL HEPATITIS (BOTKIN'S DISEASE). *(Rus.)* Safonova, E. S. (M. F. Vladimirskii Reg. Res. Inst., Moscow, USSR). *Vorp. Okhr. Materin. Det.* 18(9):25-28, 1973.

6381 DIAGNOSTIC AND PROGNOSTIC VALUE OF A NUMBER OF ENZYMES IN VARIOUS FORMS OF ACUTE VIRAL HEPATITIS IN CHILDREN. *(E.)* Popova, L. A. (Leningrad Res. Inst. Pediatr. Infections, USSR). *Vorp. Okhr. Materin. Det.* 18(9):29-32, 1973.

6382 IgM-SERUM LEVEL IN VIRAL HEPATITIS. *(Ger.)* Rogos, R.; Petzold, H.; Tauchnitz, C. (Med. Clin., Karl Marx Univ., Leipzig, Germany). *Z. Gesamte Inn. Med.* 29(9):384-386, 1974.

6383 VIRAL HEPATITIS AND HEPATITIS B ANTIGEN: RECENT ADVANCES. *(E.)* Krugman, S. (New York Univ., Sch. Med., New York). *Postgrad. Med. J.* 50(584):327-333, 1974.

6384 ABO BLOOD GROUPS AND HEPATITIS B ANTIGEN AND ANTIBODY. *(E.)* Vale, T. G.; Thomas, H. N.; Hawkes, R. A.; Kelly, A. (Prince Henry Hosp. Sydney, Australia). *Aust. NZ J Med.* 4(1):1-2, 1974.

6385 TIME-RELATED CHANGES IN REACTION DETERMINING HEPATITIS B ANTIGEN IN VIRAL HEPATITIS PATIENTS. *(E.)* Koza, J.; Rampas, J. (Inst. Hygiene and Epidemiol., Prague, Czechoslovakia). *Vox Sang.* 26(3):276-279, 1974.

6386 AUSTRALIA ANTIGEN IN VIRAL HEPATITIS AMONG EGYPTIAN CHILDREN. *(E.)* Safouh, M.; Issa, H.; El Hassan, A. M.; Sorinson, K. (Pediatr. Dept., Cairo Univ., Egypt). *Trop. Geogr. Med.* 26(1):65-67, 1974.

See also, 6047, 6174, 6391, 6395, 6412.

Chronic Hepatitis

6387 IMMUNOTHERAPY WITH ANTIBODY, LYMPHOCYTES AND TRANSFER FACTOR IN CHRONIC HEPATITIS B.

(E.) Kohler, P. F.; Trembath, J.; Merrill, D. A.; Singleton, J. W.; Dubois, R. S. (Univ. Colorado Med. Ctr., Denver). *Clin. Immunol. Immunopathol.* 2(4): 465-471, 1974.

In an effort to modify chronic hepatitis B by immunological procedures, the efficacy of adoptively transferred humoral and cell-mediated immunity was studied in 3 patients. Over a 7-day period the first patient, a female with renal failure and chronic active hepatitis, received 10 units of human plasma which had a passive hemagglutination hepatitis B antibody (HB Ab) titer of 65,540. Before treatment of the patient, her serum HB Ab was undetectable and her serum hepatitis B antigen (HB Ag) titer was 128. The HB Ab titer increased to a plateau of about 1024 during most of the period of administration of the plasma, thereafter gradually decreasing. The HB Ag titer fluctuated during this period, later dropping along with the HB Ab titer. Coexistent antigen and antibody persisted for over 4 months. Clinically, there was no change in the patient's liver function. The second patient, a female asymptomatic chronic antigen carrier, received 8 x 10^9 lymphocytes from a donor who had recovered from hepatitis B 8 months previously. This patient showed signs of transient acute hepatitis as revealed by an increase in HB Ag titer in 12 days to 4 times the pretreatment level, an increase in SGOT within 20 days to 250 IU/liter, and an increase in SGPT within 20 days to 320 IU/liter. Thereafter, the transaminases returned to normal and the HB Ag decreased to 50% of the pretreatment level. In contrast, subsequent treatment of this patient with transfer factor prepared from 1.5 x 10^9 lymphocytes from the same donor had no effect. In the third patient, 4-month-old female infant whose mother had acute hepatitis B, administration of transfer factor prepared from 4.7 x 10^9 lymphocytes obtained from the mother caused transient increases in serum HB Ag, SGOT, and SGPT. A second treatment of the infant with transfer factor from 5 x 10^8 lymphocytes caused a repetition of the transient responses, followed by a gradual decrease in HB Ag titer, prolonged increases in SGOT and SGPT, and eventual reduction of HB Ag titer by 95% and normalization of SGOT and SGPT activities. Adoptive transfer of humoral immunity does not, therefore, appear to modify established hepatitis B infection, whereas adoptive transfer of cell-mediated immunity does. It is postulated that liver cell injury in hepatitis B may be related more to the host's cell-mediated immune response than to a cytopathogenic effect of the putative hepatitis B virus.

6388 TRIALS OF IMMUNOSUPPRESSIVE TREATMENT FOR PROTRACTED HEPATITIS IN SMALL CHILDREN.

(Pol.) Rabenda, C.; Pradota, A.; Rudkowski, Z. (Med. Acad. Wroclaw, Poland). *Pediatr. Pol.* 48(3):351-356, 1973.

Immunosuppressants were used to obtain complete remissions of protracted hepatitis in 2 children with marked hepatosplenomegaly, jaundice, and elevated SGOT, SGPT, and bilirubin levels which failed to respond to corticosteroids. A 3-month-old-infant was first treated unsuccessfully for 6 weeks with prednisone (dose not specified). During the 4th month, cyclophosphamide was administered for 4 weeks, first at a dose of 1.8 mg/kg/day and then at 0.9 mg/kg/day. A full clinical and biochemical remission was achieved 10 weeks after initiation of immunosuppressive therapy (6 weeks after discontinuation of the drug). The second patient, a 27-month-old child, had brief, incomplete remissions when treated with prednisone (dose not specified), but these became less pronounced and of shorter duration. After 8 months of prednisone therapy, cyclosphosphamide was administered at a dose of 0.7 mg/kg/day. This was followed by azathioprine (0.8 mg/kg/day) combined with prednisone (dose not specified). Immunosuppressive therapy was continued for 6 months. A complete remission occurred 8 months after initiation of this therapy, 2 months after discontinuation of treatment. Both children are well 1 yr later.

6389 HUMORAL IMMUNITY IN CHRONIC LIVER DISEASE.

(E.) Simon, K.; Patakfalvi, A.; Par, A. Miszlay, Zs. (Univ. Med. Sch., Pecs, Hungary). *Acta Med. Acad. Sci. Hung.* 30(4):283-292, 1973.

To investigate possible diagnostic aids for various types of chronic liver disease, the humoral immune response was studied in 69 patients who had chronic active hepatitis (20), chronic persistent hepatitis (13), cirrhosis (23), and fatty liver (13). Tests used for serum protein changes were γ-globulin level, erythrocyte sedimentation rate, and thymol turbidity. Hyperfunction in these tests was most typical in chronic active hepatitis and least typical in fatty liver, but this was not always valid for individual cases. Changes in serum IgA, IgG, and IgM levels, regarded as characteristic for individual categories of chronic liver disease, could not be used to establish a diagnosis in individual cases. Antibody titers to *Salmonella*, *Staphylococcus*-α, *Shigella*, and *Escherichia coli* did not appear to reflect variations in serum immunoglobulin levels. However, antibodies to enteric bacteria (*Salmonella*, *Shigella*, and *E. coli*) were more valid indicators of enhanced immune activity that those to nonenteric bacteria (*Staph.*-α). The most consistent rise in enteric antibody titer was found in chronic persistent hepatitis. The final parameter studied was the level of autoantibody serum factors (rheumatoid, lupus erythematosus, and antinuclear and/or anticytoplasm factors together with complement-fixing antibodies to subcellular fractions). Immunofluorescence tests for antinuclear and/or anticytoplasmic factors, together with complement-fixation tests with subcellular fractions, were quite specific for chronic active hepatitis, giving positive results in 18 of 20 cases. Both these tests were completely negative, however, in patients with fatty liver, and the complement-fixation test was also negative in patients with chronic persistent hepatitis. The tests for rheumatoid factor were far less specific than the immunofluorescence and complement-fixation tests for chronic active hepatitis. The presence of these autoantibodies suggest probable involvement of autoimmune mechanisms in chronic liver disease.

6390 PRELIMINARY RESULTS FROM TREATING CHRONIC AGGRESSIVE HEPATITIS WITH D-PENICILLAMINE (CUPRENIL "POLFA"). *(Pol.)* Eisner, M.; Goertz, J.; Dobrohorska, H.; Bohdanowicz, I. (Pomeranian Acad. Med., Szczecin, Poland). *Pol. Tyg. Lek.* 28(44):1721-1724, 1973.

Good results were obtained by treating 5 patients (2 men and 3 women, aged 31-67 yr) with 9-43 month histories of chronic aggressive hepatitis for 6-12 months with d-penicillamine. The drug was administered in increasing dosages until 1000-1500 U/day were reached. All patients received vitamin B_6 and 1 was given prednisone in decreasing amounts (30-5 mg/day). Four of the 5 had previously been treated with prednisone alone or with prednisone and azathioprine and had developed steroid diabetes. Full or partial clinical remissions were achieved which lasted 3-18 months after discontinuation of treatment. Jaundice, fever, hepatosplenomegaly, and hemorrhagic diathesis disappeared, and biochemical parameters (bilirubin, SGPT, alkaline phosphatase, proteinogram, plasma unstable colloids, and iron) were completely or partially normalized in all patients. Follow-up liver biopsies performed on 3 patients 8, 10, and 15 months after treatment revealed a marked decrease in inflammation and no progression of necrosis. Steroid diabetes disappeared. With the exception of 1 patient who developed allergic dermatitis, forcing discontinuation of treatment after 8 months, d-penicillamine was well tolerated.

6391 CELL-MEDIATED IMMUNITY TO HEPATITIS B ANTIGEN IN ANTIGEN-NEGATIVE ACTIVE CHRONIC HEPATITIS. *(E.)* Reed, W. D.; Lee, W. M.; Eddleston, A. L. F. W.; Mitchell, C. G.; Zuckerman, A. J.; Williams, R. (King's Coll. Hosp., London, England). *Gut* 15(4):341-342, 1974.

6392 EFFECT OF AGEING ON THE LEVELS OF THE MAIN CLASSES OF SERUM IMMUNOGLOBULINS IN ACTIVE CHRONIC HEPATITIS AND IN CLINICALLY HEALTHY SUBJECTS. *(E.)* Hrncir, Z.; Nerad, V.; Skaunic, V.; Tichy, M. (Fac. Med., Charles Univ., Hradec Kralove, Czechoslovakia). *Rev. Czech. Med.* 19(4):215-222, 1973.

6393 CLINICAL SIGNIFICANCE OF IDENTIFICATION OF THE AUSTRALIAN ANTIGEN (HAA) IN CHRONIC HEPATITIS AND LIVER CIRRHOSIS. *(E.)* Loginov, A. S.; Tartseva, A. M.; Iakinchuk, G. N. (All-Soviet Sci. Res. Inst. Gastroenterol., Moscow, USSR). *Sov. Med.* 36(5):12-17, 1974.

6394 CHRONIC HEPATITIS AND CIRRHOSIS IN CHILDREN. *(Rus.)* Malakhovskii, Iu. E. (Kemerovo Med. Inst., USSR). *Vopr. Okhr. Materin. Det.* 18(9):3-9, 1973.

6395 CONTROLLED TRIALS OF IMMUNOSUPPRESSIVE THERAPY IN HEPATITIS. *(E.)* Stern, R. B.; Williams, R. (King's Coll. Hosp., London, England). *Postgrad. Med. J.* 50(584):392-394, 1974.

See also, 6275, 6280, 6382, 6407.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

6396 ELECTRON MICROSCOPE STUDY OF MECHANISMS BY WHICH HEPATIC LIPIDS ARE DEPOSITED AND DISAPPEAR IN ALCOHOLIC STEATOSIS. *(Fr.)* Tanikawa, K.; Miyakoda, U. (Med. Sch., Univ. Kurume, Japan). *Ann. Gastroenterol. Hepatol. (Paris)* 9(5):411-422, 1973.

Electron microscope examinations were made of material biopsied from the livers of 5 patients with alcoholic steatosis shortly after their admission to the hospital and 1-2 weeks after they had been placed on a high-protein diet and had abstained from alcohol. Blood samples were collected at the same times to analyze the blood lipid composition and to perform liver function tests. Initially large lipid droplets were found in almost all of the liver cells. The most pronounced ultrastructural change was marked dilatation of cisternae in the rough endoplasmic recticulum. This appeared to be the initial stage in the accumulation of lipids in the liver. Membranous structures appeared along the edges of fat droplets as large fat droplets developed rapidly by fusion of small fat inclusions. Giant mitochondria and iron deposits were common, and the cytoplasm of fat storage cells, ordinarily found in Disse's spaces, contained an increased number of fat droplets. As liver cells returned to normal, many vesicles containing osmophilic particles, probably lipoproteins, were observed in the endoplasmic reticulum. Proliferation of the Golgi apparatus was associated with increases in the levels of the serum triglycerides and pre-β-lipoproteins. This suggests that trigylcerides which had been deposited in the liver are actively liberated into the blood during regression of fatty liver.

6397 ALPHA-1-FETOPROTEIN AND ALCOHOLIC HEPATITIS. *(E.)* Meshkinpour, H.; Wepsic, H. T.; Schmalhorst, W. R. (Kern Gen. Hosp., Bakersfield, Calif.). *Am. J. Dig. Dis.* 19(8):709-713, 1974.

A chronic alcoholic male, aged 41 yr, was admitted for progressive nausea, vomiting, weakness, and increased abdominal girth. He was deeply jaundiced and slightly edematous, but there was no evidence of portosystemic encephalopathy. The SGOT value was 210; alkaline phosphatase, 310 mIU/ml; and hepatitis-associated antigen, negative. On the 2nd, 3rd, and 5th hospital days, serum α_1-fetoprotein, determined by quantitative electroimmunodiffusion, was reported as 25, 30 and 50 µg/ml, resp., compared to the value of 0.06 µg/ml for the upper normal limit. A 4th blood sample on the 18th hospital day was studied by radioimmunoassayand revealed an α_1-fetoprotein value of 0.35 µg/ml. After the patient's death in hepatorenal syndrome on the 22nd hospital day, autopsy revealed no gross evidence of hepatic tumor. Microscopic examination showed an overall picture of Laennec's cirrhosis with superimposed alcoholic hepatitis. No evidence of malignancy was seen in other organs. Based on previous evidence of production of α_1-fetoprotein following hepatocyte proliferation *in vivo* or *in vitro*, it is speculated that the transient elevation of serum α_1-fetoprotein in this patient was caused by a population of dividing hepatocytes. This case clearly demonstrates that elevated serum α_1-fetoprotein may be seen in alcoholic liver disease in the absence of any neoplastic disease. It is proposed that monitoring the rate of increase in α_1-fetoprotein concentration may be helpful in differentiating hepatocellular carcinoma, for which elevations over a short period are to be expected, from liver regeneration secondary to alcoholic or viral hepatitis, for which only a transient elevation is to be expected with a return to normal levels as liver regeneration subsides.

6398 ABSORPTION OF HEMOGLOBIN AND HEMOGLOBIN IRON IN ALCOHOL-INDUCED LIVER INJURY. *(E.)* Bungert, H. J. (Steglitz Clin., Free Univ. Berlin, Germany). *Digestion* 9(4):293-308, 1973.

Experiments were conducted to determine if hemoglobin could be absorbed as a complete molecule in Sprague-Dawley rats with liver injury induced by p. o. administration of 39.34% ethanol (7 g/kg/day) through a stomach tube for 3 weeks. The injury consisted of fatty metamorphosis with focal hepatocellular degeneration and round cells. Unlabeled human hemoglobin (500 mg/kg) prepared from crude red cell sediment, was administered p. o. through a stomach tube to rats with liver injury, pair-fed normal rats, and anemic rats (bled 5 ml for 4 days); all rats were fed a diet containing 18 mg iron/1000 g diet and 19% protein. Comparison was also made between iron absorption in iron-deficient, alcohol-fed, normal, and iron-loaded rats given labeled hemoglobin-iron (100 µg p.o. through a stomach tube). Immunoelectrophoresis and gel filtration studies showed no absorbed hemoglobin in healthy or anemic rats. Animals with alcohol-induced liver injury absorbed 15% of the administered iron. The serum iron content was significantly higher in these animals, indicating a two-step mechanism for iron absorption. Serum heme iron was also enhanced, as was total liver iron. Alcohol-fed animals were not anemic. Immunofluorescent investigations showed yellow-green fluorescent duodenal cells 90 min after hemoglobin and hemoglobin-haptoglobin administration to rats; anti-hemoglobin (crude and purified) antibodies complexed with fluorescein isothiocyanate. The same fluorescent cells were benzidine-positive. On polyacrylamide gels, hemoglobin-haptoglobin and free heme in liver homogenates could be detected with the benzidine reaction. These results indicate that hemoglobin is absorbed and transported to the liver as a hemoglobin-haptoglobin complex in rats with ethanol-induced liver injury. It is noted that iron, split from hemoglobin in the lumen, is absorbed in the 1st phase of iron absorption. At the same time, ferritin is produced in small quantities. In the 2nd phase, iron split from hemoglobin in mucosal cells and hemoglobin itself are transported to the portal blood. Of the 2 iron-binding proteins involved in hemoglobin absorption, one is ferritin and the other a protein similar to transferrin. The latter could be haptoglobin or a hemoglobin-haptoglobin complex.

See also, 5830, 5990, 6320, 6399.

LIVER AND BILIARY TRACT

Cirrhosis

6399 THERAPEUTIC PORTACAVAL SHUNT: PRELIMINARY DATA ON CONTROLLED TRIAL AND MORBID EFFECTS OF ACUTE HYALINE NECROSIS. *(E.)* Mikkelson, W. P. (Univ. Southern California Sch. Med., Los Angeles). *Arch. Surg.* 108(3):302-305, 1974.

A controlled study of end-to-side portacaval shunt as a therapeutic measure for treatment of patients having liver cirrhosis associated with alcoholism was carried out. Thirty four patients in one randomized group were operated upon; 35 in another group were given medical treatment. The shunted patients showed a five-year survival rate of 60%; the medically treated patients, 10%. There were twice as many deaths in the medically treated group as in the group operated upon (18 *vs* 9). Recurrent encephalopathy occurred in 7 of the shunted patients, 2 of whom were among those who died, while none of the medically treated patients developed the syndrome. Moderate to severe degrees of acute hyaline necrosis adversely affected the survival after portacaval shunt, indicating the need for liver biopsy preceeding consideration of the operation.

6400 INVESTIGATIONS ON PLASMA VISCOSITY IN PATIENTS WITH CIRRHOSIS OF THE LIVER. *(E.)* Leonhardt, H.; Bungert, H. J. (Free Univ., Berlin, Germany). *Acta Hepatogastroenterol.* 21(2):127-130, 1974.

In studies carried out on 29 patients with cirrhosis of the liver and on 26 healthy subjects matched for age and sex, it was demonstrated that the mean plasma viscosity for the former group was significantly higher than that for the latter. The viscosity showed a positive correlation with total protein, gamma-globulin, and fibrinogen. The raised gamma-globulins in patients with cirrhosis of the liver were principally responsible for the higher plasma viscosity.

6401 BLOOD AMMONIA LEVELS IN ADVANCED CIRRHOSIS DURING THERAPEUTIC ELEVATION OF THE INSULIN:GLUCAGON RATIO. *(E.)* Walker, C.; Peterson, W.; Unger, R. (Univ. Texas Health Sci. Ctr., Dallas). *N. Engl. J. Med.* 291(4):168-171, 1974.

To determine whether inhibition of hepatic ureagenesis by increased insulin secretion or decreased glucagon secretion might reduce ammonia formation, a group of 5 patients with advanced cirrhosis was administered an oral glucose dietary supplement. Oral glucose supplementation was used as a device for augmenting insulin secretion and reducing glucagon secretion. Hepatic ureagenesis was viewed as a byproduct of gluconeogenesis from amino acids and was expected to be inhibited by insulin and augmented by glucagon. Urea, in turn, was expected to be converted to ammonia by urea-splitting bacteria in the large bowel. The patients selected for the study showed a consistent basal and post-prandial hyperammonemia while on a diet containing 40-60 g/day protein. Each patient was subjected to 4 separate 9-hr studies in 2 of which the diet was supplemented hourly with 20 g oral glucose. Plasma insulin and glucagon and blood ammonia were measured at frequent intervals. Without glucose supplementation, mean blood ammonia rose 20 μg/100 ml, insulin averaged greater than 50 μU/ml, and glucagon averaged greater than 160 pg/ml. With glucose supplementation, mean insulin rose to 201 μU/ml and glucagon fell below basal values, while blood ammonia did not rise, but declined significantly. A causal connection was suggested between the rise in the insulin:glucagon ratio and the decline in blood ammonia. The explanation was offered that the high insulin:glucagon ratio may have reduced the blood ammonia after a protein meal by decreasing hepatic ureagenesis directly, or indirectly through a reduction in amino acid availability for gluconeogensis, or both. Reduction in amino acid availability for gluconeogenesis might result from the action of insulin in increasing amino acid incorporation into protein.

6402 PREDICTORS OF SURGICAL MORTALITY IN PATIENTS WITH CIRRHOSIS AND NONVARICEAL GASTRODUODENAL BLEEDING. *(E.)* Wirthlin, L. S.; van Urk, H.; Malt, R. B.; Malt, R. A. (Massachusetts Gen. Hosp., Boston). *Surg. Gynecol. Obstet.* 139(1): 65-68, 1974.

Records of 63 cirrhotic patients were analyzed for determinants of mortality after operations for emergency control of nonvariceal upper gastrointestinal bleeding. The aggregate mortality rate was 57%, where mortality was defined as death during hospitalization or within 6 weeks of operation. Causes of bleeding were chiefly peptic ulceration and gastritis. Experience of the surgeon, choice of operation, and duration of operation were not significant predictors of death. Although the serum bilirubin level taken just before surgery was the best single predictor of death for grouped data, a more accurate estimate for an individual patient could be derived from an empiric five point score, where one point is assigned for presence of each of the following signs or tests: serum bilirubin level over 2 mg/dl, serum albumin level less than 3 g/dl, prothrobin time over 16 sec, presence of encephalopathy, and presence or history of varices. The total predicts mortality with near linearity. A score of even 1 point is associated with a 43% mortality rate; 3 points, with 85% rate; 4 points, with invariable death. For most cirrhotic patients bleeding from peptic ulcer or gastritis, attempts at controlling the hemorrhage with selective intra-arterial infusion of vasopressin seemed preferable to an emergency operation on the stomach or duodenum.

6403 PREOPERATIVE PARAMETERS INFLUENCING SURVIVAL IN PATIENTS WITH ELECTIVE PORTACAVAL SHUNTS. *(E.)* Maillard, J. N.; Clot, P.; Coste, T. (Beaujon Hosp., Clichy, France). *Digestion* 10:129-137, 1974.

In 145 patients submitted to elective portacaval anastomosis for intrahepatic block and followed up for periods ranging from 1 to 9 years, long-term survival was analyzed in its relation to the 4 classical preoperative parameters: age, liver size, hepatic histology, and hepatic function. The range in age was from 20 to over 60 yr. Liver size was determined by preoperative splenoportography and was confirmed at operation. Hepatic histology was evaluated on the basis of fibrosis, inflammatory change, and cell changes. Hepatic function was based on plasma fibrinogen, Factor VII, Factor X, serum albumin, serum bilirubin, and BSP clearance. The findings showed no relation between age at time of operation and mortality. Patients whose livers were of normal size survived longer than those whose livers were atrophic or hypertrophic, but there was no difference in survival between the groups with atrophic and hypertrophic livers. Histological change and impairment of hepatic function were related to mortality in the first post-operative year only. This last finding might be attributed to the selection effected during the first year, which is more sparing of those with moderate than of those with severe pathological changes; to the fact that the subjects with the most advanced cirrhosis are the least exposed to work accidents or to the consequences of arterial atheroma; or to the need of the liver of about a year to adapt itself to the new hemodynamic conditions imposed by a portal-systemic shunt.

6404 HIGH PROTEIN ASCITES IN PATIENTS WITH UNCOMPLICATED HEPATIC CIRRHOSIS. *(E.)* Sampliner, R. E.; Iber, F. L. (VA Hosp., Baltimore, Md.). *Am. J. Med. Sci.* 267(5):275-279, 1974.

Ascitic fluid protein concentrations of greater than

2.5% in cirrhosis are usually interpreted as evidence of superimposed neoplastic, infectious, or other inflammatory processes. To test the validity of this arbitrary criterion, hospital laboratory records were examined for level of ascitic fluid protein in uncomplicated cirrhosis. Twenty-one such patients were found, having ascitic fluid protein levels ranging from 2.6 to 4.1%. To determine the frequency of high protein ascites, 98 consecutive hospital admissions with uncomplicated cirrhosis and ascites were reviewed. Nineteen had ascitic fluid protein greater than 2.5% and 12 a protein concentration greater than 3.0%. The ascites fluid protein ranged from 0.1 to 4.3%, with a mean of 1.5%. Thus, high protein ascites is more common in uncomplicated cirrhosis than had been recognized.

6405 HYPERGLUCAGONEMIA IN LAENNEC'S CIRRHOSIS: THE ROLE OF PORTAL-SYSTEMIC SHUNTING. *(E.)*

Sherwin, R.; Joshi, P.; Hendler, R.; Felig, P.; Conn, H. O. (Yale Univ. Sch. Med., New Haven, Conn.). *N. Engl. J. Med.* 290(5):239-242, 1974.

Plasma pancreatic glucagon concentrations in 18 men (aged 35-7 yr) with Laennec's cirrhosis were determined in the basal state and after alanine infusion (0.15 g/kg for 2-5 min). For the entire group of patients, basal glucagon concentrations were 3 times greater than in 11 control subjects, while the glucagon response to alanine was 3 to 13 times greater. Glucagon levels were highest in 4 patients with portacaval anastomosis, less elevated in 10 with spontaneous portal-systemic shunting, and normal in 4 without portal-systemic shunting. In all 3 groups glucagon concentrations correlated closely with the degree of ammonia intolerance. Elevations of plasma tyrosine, methionine, and phenylalanine were observed in the cirrhotic group, whereas the levels of branched-chain amino acids (valine, leucine, and isoleucine) were reduced. Hyperglucagonemia may contribute to the glucose intolerance observed in cirrhosis.

6406 ANTIBODIES TO HUMAN ALBUMIN IN CIRRHOTIC SERA. *(E.)*

Hauptman, S.; Tomasi, T. B. (Mayo Fdn., Rochester, Minn.). *J. Clin. Invest.* 54(1): 122-127, 1974.

Antibody-like activity against altered human albumin was demonstrated in 7 of 18 (40%) sera from patients with Laennec's cirrhosis. Agglutinating activity toward sheep RBC coated with aggregated albumin was present in the void volume on Sephadex G-200 chromatography and was shown to be due to an immunoglobulin by its removal on passage over an anti-L-chain immunoadsorbent column. IgA was isolated from cirrhotic sera by acid elution from an aggregated albumin immunoadsorbent column. Complex formation between albumin and the IgA was demonstrated by absorption of the IgA and of a ^{125}I-labeled fragment with antigen-binding activity (Fabx) derived from it on aggregated albumin columns. The specificity of cirrhotic IgA for altered albumin was also shown by facilitated hemagglutinatation of sheep RBC coated with aggregated albumin. In control tests, normal and myeloma IgA and myeloma Fabx fragments showed no evidence of complex formation with albumin. Restriction of the antibody response to the IgA class may result from the formation of antibodies against albumin altered during metabolism in the gastrointestinal tract. With regard to the possible biological effects of antialbumin antibodies, it is suggested that such antibodies alter the synthesis and/or catabolism of albumin. It is also suggested that immune complexes containing altered albumin, or the development of delayed hypersensitivity to albumin, might perpetuate liver damage induced by alcohol.

6407 MITOCHONDRIAL ANTIBODIES IN EXTRAHEPATIC BILIARY OBSTRUCTION. *(E.)*

Richer, G.; Viallet, A. (Saint-Luc Hosp., Montreal, Canada). *Am. J. Dig. Dis.* 19(8):740-744, 1974.

To re-examine the question of whether the presumably specific serum mitochondrial antibody test for primary biliary cirrhosis would exclude extrahepatic biliary obstruction, 732 patients were divided into 7 groups according to their diagnosis and their sera were examined for the presence of antimitochondrial antibody by indirect immunofluorescence using rat kidney sections. While 5 of 5 patients with primary biliary cirrhosis, 3 of 25 with chronic hepatitis, and 1 of 159 with alcoholic liver disease gave a positive test, all 36 patients with extrahepatic biliary obstruction, 100 with viral hepatitis, 56 with other liver diseases, and 351 without known liver disease gave a negative test. Of the patients with extra-hepatic biliary obstruction, 14 had histories of obstruction dating back more than 3 months. It is concluded that the presence of mitochondrial antibodies in serum remains a useful diagnostic tool in the differential diagnosis between primary biliary cirrhosis and extrahepatic biliary construction.

6408 BILE ACIDS IN HEPATIC BILE IN LIVER DISEASE. *(E.)*

Kuroda, T.; Okuda, K. (Chiba Univ. Sch. Med., Japan). *Acta Hepatogastroenterol.* 21(2): 120-126, 1974.

Bile acids in hepatic bile of patients with various liver disorders were analyzed by thin-layer chromatography. Samples were collected through a duodenal tube from 50 patients, aged 15-66 yr, with mild to moderately severe acute hepatitis (22), chronic aggressive hepatitis (5), cirrhosis of the posthepatitic type (12), cholelithiasis with stones in the bladder, probably of the cholesterol type (4), and external biliary drainage (9) of whom 6 had had cholecystectomy for stones and 3 resection of the pancreas head and had a Nealton type catheter in the common duct. Deoxycholic acid was markedly decreased relative to cholic acid and chenodeoxycholic acid in patients with external bile fistula and acute hepatitis, and to a lesser extent in liver cirrhosis and chronic hepatitis. The glycocholate/taurocholate ratio was decreased in acute hepatitis but was increased remarkably in fistula bile. The clinical significance of the observed decreases of deoxycholate and glycine/taurine ratio in liver diseases has yet to be clarified.

6409 COMPARATIVE STUDY OF LACTULOSE AND NEOMYCIN IN THE TREATMENT OF PORTOSYSTEMIC ENCEPHALOPATHY. *(Sp.)* Sala Felis, T.; Berenguer, J.; Barrios, J. M.; Gomez, J. (La Fe Munic. Sanit., Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 42(3):335-342, 1974.

Alternate 14-day courses of lactulose (90 ml/day p. o. divided into 3 doses) and neomycin (3 g/day p.o. divided into 3 doses) were administered to 12 patients (5 men and 7 women) with portosystemic encephalopathy. Initially these patients were fed a diet containing 40-60 g/day protein. After 7 days the dietary protein intake was increased to 100 g/day and the same medication was continued for another 7 days. During the 3rd week medication was discontinued and patients were allowed to eat what they wanted. During weeks 4 and 5, patients initially given neomycin received lactulose and *vice versa*. No significant differences were found between the effects of neomycin and lactulose on clinical symptoms (somnolence, flapping tremor, fetor hepaticus) or blood ammonia levels. Lactulose never produced deteriorations in the electroencephalogram. In 5 cases lactulose caused more improvement in the electroencephalogram than neomycin, while in 7 cases results obtained with lactulose and neomycin were comparable. Increased dietary protein intake was tolerated better with lactulose in 5 cases and with neomycin in 2; in 5 other cases the results with both drugs were similar. Lactulose, although it had to be discontinued in 1 case, produced fewer side effects than neomycin: 10 patients tolerated lactulose well and 2 developed pronounced flatulence, borborygmus, diarrhea, and a distaste for the drug. Neomycin produced epigastric pain, nausea, pyrosis, and constipation in 6 patients. From these findings and others in the literature, it is concluded that lactulose is a very useful drug for the treatment of portosystemic encephalopathy.

6410 SPONTANEOUS PERITONITIS IN CIRRHOTIC ASCITES. *(E.)* Curry, N.; McCallum, R. W.; Guth, P. H. (Wadsworth VA Hosp., Los Angeles, Calif.). *Am. J. Dig. Dis.* 19(8):685-692, 1974.

Spontaneous bacterial peritonitis was identified in a 10-yr retrospective study of 15 patients (14 males and 1 female, aged 33-62), with cirrhosis and ascites. Laennec's cirrhosis was diagnosed in 13 patients and chronic active hepatitis with postnecrotic cirrhosis in 2. All patients had abdominal pain prior to diagnosis, fever was present in 11 (73%), increasing hepatic encephalopathy in 5 (33%), unexplained shock in 3 (20%), and esophageal variceal bleeding in 2 (13%). Diagnosis was established by paracentesis with the finding of either an elevated ascitic fluid cell count (>300 WBC/mm^3) in 13 cases or organisms and numerous neutrophiles on gram stain in 6 cases. *Escherichia coli* was the most common organism and was isolated from 6 patients on ascitic fluid culture. *Klebsiella* was isolated in 3, and *Diplococcus pneumoniae* in 2 cases. Positive blood cultures were obtained in 60% of the patients. Therapy, including antibiotics, was successful in 3 patients who survived to leave the hospital. Neither delay in diagnosis nor severity of liver disease were of value in separating survivors from nonsurvivors. Nonsurvivors died from complications of advanced liver disease such as hepatic coma, hepatorenal syndrome, and esophageal variceal bleeding. It is concluded that spontaneous peritonitis is a diagnosable and possibly treatable cause of deterioration in the cirrhotic patient. Due to its varied presentation it may escape recognition.

6411 INTERMITTENT IDIOPATHIC PORTAL HYPERTENSION. *(E.)* Mendenhall, C. L.; Sherman, J.; Chedid, A. (VA Hosp., Cincinnati, Ohio). *Gastroenterology* 67(1):142-148, 1974.

A 46-year-old patient with idiopathic portal hypertension for which the initial symptoms were nausea and vomiting of blood developed a series of exacerbations and remissions as documented by clinical, laboratory, and manometric studies over an 18-month observation period. The liver pathology was initially normal, but gradually deteriorated as revealed in the portal areas by venous dilation, increased prominence and density of collagenous tissue, and thickening of the arterial muscularis. Hepatic vein wedge pressure was elevated at 272 mm saline. Hepatic blood flow was 642 ml/min, compared to normal values of 1000-1500 ml/min. Liver function tests were otherwise essentially normal. Esophagoscopy at times of remission revealed varices. Splenomegaly also appeared intermittently and the splenic pulp pressure was found on different occasions to be 238 and 258 mm saline. Treatment with oral guanethidine, 10 mg/day at first, 25 or 30 mg/day later, resulted in a rapid fall in splenic pulp pressure to within normal limits of 122 to 162 mm saline and a decrease in splenic size. A splenorenal shunt operation was eventually performed, and reevaluation of the patient 1 yr later showed no evidence of esophageal varices or abnormal liver function, but pathological examination of the liver indicated slowly progressive periportal fibrosis. Special interest in this patient had to do with the appearance of esophageal varices without initial evidence of portal obstruction or hepatic cirrhosis, a portal vein wedge pressure less than the splenic pulp pressure, and the intermittent character of the portal hypertension and the splenomegaly. The data are considered to be consistent with a vasospastic process resulting from either a circulating or fixed tissue substance which affects both sinusoidal and portal vasculature so as to produce a combined para- and presinusoidal hypertension with a decreased total hepatic blood flow.

6412 KINETICS OF DEHYDROEPIANDROSTERONE SULPHATE IN NORMAL CONTROLS AND PATIENTS WITH LIVER CIRRHOSIS AND ACUTE HEPATITIS. *(E.)* Oseko, F.; Yoshima, T.; Fukase, M.; Kono, T. (Sch. Med., Kyoto Univ., Japan). *Acta Endocrinol.* 76(2):332-342, 1974.

6413 RETROSPECTIVE STUDY ON THE EVALUATION OF DIAGNOSTIC PROCEDURE FOR HEPATOMA IN PATIENTS WITH CIRRHOSIS OF THE LIVER. *(E.)* Kawata, H.; Shimizu, Y.; Kojima, G.; Taniguchi, T.; Nishiyama, S. (Osaka Rosai Hosp., Japan). *Acta Hepatogastroenterol.* 21(2):106-119, 1974.

6414 BUMETANIDE IN THE TREATMENT OF HEPATIC ASCITES. A SHORT AND LONG TERM STUDY. *(E.)* Ring-Larsen, H. (Rigshosp., Univ. Hosp., Copenhagen, Denmark). *Acta Med. Scand.* 195(5):411-414, 1974.

6415 SECRETION OF WATER AND ELECTROLYTES INTO THE DUODENUM IN NORMAL SUBJECTS AND IN PATIENTS WITH CIRRHOSIS: THE RESPONSE TO SECRETIN AND PANCREOZYMIN. *(E.)* Turnberg, L. A.; Grahame, G. (Royal Free Hosp., London, England). *Gut* 15(4):273-277, 1974.

6416 PORTAL HYPERTENSION: SURGICAL MANAGEMENT IN INFANTS AND CHILDREN. *(E.)* Ehrlich, F.; Pipatanagul, S.; Sieber, W. K.; Kiesewetter, W. B. (Children's Hosp., Pittsburgh, Pa.). *J. Pediatr. Surg.* 9(3):283-287, 1974.

6417 MACRO-REGENERATING NODULE IN THE CIRRHOTIC LIVER. RADIOLOGIC FEATURES AND DIFFERENTIAL DIAGNOSIS. *(E.)* Rabinowitz, J. G.; Kinkabwala, M.; Ulreich, S. (Dept. Radiol., State Univ. New York, Brooklyn). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(2):401-411, 1974.

6418 INCIDENCE AND SIGNIFICANCE OF HAEMATEMESIS IN CIRRHOSIS. *(E.)* Moffat, H.; Gelfand, M. (Dept. Med., Univ. Rhodesia, Salisbury). *S. Afr. Med. J.* 48(27):1155-1158, 1974.

See also, 5865, 6046, 6049, 6055, 6270, 6273, 6275, 6311, 6314, 6326, 6342, 6343, 6344, 6346, 6389, 6393, 6394, 6397.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

6419 GALLSTONE DISSOLUTION IN VITRO BY BILE ACIDS, HEPARIN, AND QUATERNARY AMINES. *(E.)* Lahana, D. A.; Bonorris, G. G.; Schoenfield, L. J. (Cedars-Sinai Med. Ctr., Los Angeles, Calif.). *Surg. Gynecol. Obstet.* 138(5):683-685, 1974. 138(5):683-685, 1974.

Cholesterol gallstones from 3 patients were immersed in solutions of bile salts, heparin, hexamethonium, and/or cetylpyridinium. Of the three bile salts tested sodium cholate dissolved 44% of the total weight of the stone, as compared with a 26% dissolution with chenodeoxycholate and 14% with deoxycholate. The decrease in stone weights were accounted for by the dissolved cholesterol in the bathing solutions. Heparin dissolved 20 to 41% of the stone by fragmentation, the degree of fragmentation being dependent on the concentration of heparin. Hexamethonium achieved an 8% fragmentation, while cetylpyridinium produced a 40% fragmentation. In heparin mixed with sodium cholate, 51-57% of the stones dissolved, the degree of dissolution being dependent on the heparin concentration. In addition, the rate of dissolution remained the same for 7 days with the mixed solution, while it diminished with either heparin or cholate alone. Stone dissolution was not increased by other combinations of bile acids, surface-active agents, and heparin. After appropriate safety testing in animals, these agents should be studied further as T-tube infusates for the dissolution of retained duct stones.

6420 URINARY FLUORESCENCE IN PATIENTS WITH JAUNDICE. *(Rus.)* Starosel'skii, D. V.; Ul'ianov, A. P. (Crimean Med. Inst., Simferopol, USSR). *Lab. Delo* (11):653-655, 1973.

After precipitation of bile pigments with lead acetate, the intensity of fluorescence and fluorescence spectra were measured on dilute 24-hr urine specimens from 40 patients with hepatitis, 4 with obstructive jaundice, and 4 normal controls. Fluorescence was also studied visually on urine from 120 patients with viral hepatitis, 11 with obstructive jaundice resulting from pancreatic carcinoma, and 10 normal controls. In most cases, the intensity of fluorescence was greater in urine from hepatitis patients than in normal urine. Fluorescence was most intense at the onset and decreased with recovery in patients with mild hepatitis while the reverse was true of those with severe hepatitis. The method of treatment employed had no effect on urinary fluorescence. The intensity of urinary fluorescence increased as the disease progressed in patients with obstructive jaundice. Fluorescence spectra revealed that increased fluorescence observed in 2/3 of the patients with hepatitis was due to increases in bands with maxima at 460 and 516 nm. Only the band at 516 nm was visible in patients with obstructive jaundice and at the onset of symptoms in 1/3 of those with hepatitis. These findings indicate that changes in fluorescence which occur in patients with jaundice are not due to the presence of bile pigments or to unusual fluorescent products, but to the presence of substances which extinguish the shortwave part of the fluorescence spectrum, thereby changing the color of the fluorescence. Although examination of urinary fluorescence would appear to be of no value in the differential diagnosis of jaundice, an early increase in the intensity of fluorescence and a change in its color could serve as one of the signs for diagnosing mild or subclinical forms of viral hepatitis. However, the effect of other diseases and drugs (none of which are used to treat viral hepatitis) must be taken into consideration.

6421 CHOLANGIOMETRY PERFORMED DURING SURGERY: RESULTS OF 375 DETERMINATIONS. *(Sp.)*

Romano, S. (Ciudadela Polyclin., Buenos Aires, Argentina). *Rev. Esp. Enferm. Apar. Dig.* 42(2):155-164, 1974.

Measurements of residual pressure and flow were performed on 375 patients during surgery on the extrahepatic biliary tract. Patients undergoing emergency surgery and those with jaundice or gross evidence of tumors were excluded. Anesthetics and drugs interfering with function of the duodenal muscle and sphincter of Oddi were avoided. After catheterization of the cystic duct with a metal sound, the residual pressure was measured with a Becton Dickinson water manometer and flow was investigated by perfusing a saline solution through at 37 C. In 317 cases the flow of saline was greater than 12 ml and the residual pressure was less than 15 cm H_2O, indicating that no obstructions were present. Flows of less than 12 ml and residual pressures higher than 15 cm H_2O, present in 40 patients, suggested that obstructions were present in the common bile duct or at the choledochoduodenal junction; only 1 false-positive result was obtained in this group. The 39 patients with confirmed obstructions consisted of 27 with choledocholithiasis, 6 with choledocholithiasis and stenosis of the sphincter of Oddi, 5 with stenosis of the sphincter of Oddi, and 1 with stenosing pancreatitis. Of 6 patients with residual pressures of less than 15 cm H_2O and flows greater than 12 ml, 2 had gallbladder disease associated with choledocholithiasis. Pressures less than 15 cm H_2O and flows of less than 12 ml, found in 7 patients, were probably due to partial obstructions which made it possible for the pressure to slowly stabilize at normal values but decreased the flow. Thus, false-positive results were obtained in only 12 (2.5%) of the 375 patients examined.

6422 PIGMENT vs CHOLESTEROL CHOLELITHIASIS: COMPARISON OF STONE AND BILE COMPOSITION. *(E.)*

Trotman, B. W.; Ostrow, J. D.; Soloway, R. D. (Hosp. Univ. Pennsylvania, Philadelphia). *Am. J. Dig. Dis.* 19(7):585-590, 1974.

A comparative study of gallstone and gallbladder bile composition was made using 100 unselected American patients, 23 with pigment and 77 with cholesterol cholelithiasis. Cholesterol stones were composed of an unidentified residue, bilirubin, and bile salts. The residue in pigment stones was not calcium bilirubinate, which sharply contrasts with the composition of bile pigment calcium stones found in Japanese subjects. Bile composition of the two groups differed in that the cholesterol content of biles surrounding pigment stones was significantly less than that of biles surrounding cholesterol stones. Bilirubin in biles was conjugated, but the pigment extracted from stones was unconjugated bilirubin. The data suggest that conjugated bilirubin is hydrolyzed during or after stone formation.

6423 ABNORMAL COMMUNICATION BETWEEN THE GASTROINTESTINAL AND BILIARY TRACTS. (BILIODIGESTIVE FISTULAS AND INCOMPETENCE OF THE SPHINCTER OF ODDI.

(Sp.) Perez Jimenez, F.; Muros, J.; Hitos, E. (La Paz Munic. Sanit., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 39(2):129-142, 1973.

Case reports are presented for 7 patients with biliodigestive fistulas, 2 with malfunction of the sphincter of Oddi, and 2 whose problems were not definitely diagnosed. Of 3 patients with surgical fistulas, 2 had undergone choledochoduodenostomy for jaundice which developed after cholecystectomy and for a benign stricture of the common bile duct, resp., and 1 had undergone cholecystojejunostomy for a malignant neoplasm in the head of the pancreas. Although i.v. cholangiography, performed on 2 of these patients, did not visualize the biliary tract, a barium meal did. One patient with a choledochoduodenostomy remained asymptomatic for 20 yr before developing esophageal varices and symptoms of cirrhosis. Malfunction of the sphincter of Oddi, diagnosed in 2 patients resulted from a surgical papillotomy in one and probably from a calculus which damaged the sphincter before passing into the duodenum in the other. Simple abdominal radiography demonstrated aerobilia in both cases; the cause of the aerobilia was established only at surgery in one patient, but was evident from a barium meal in the other. Of the 4 patients with spontaneous fistulas, 1 had a choledochoduodenal fistula, 2 had cholecystoduodenal fistulas, and 1 had a cholecystogastric fistula. The fistulas were definitely caused by calculi in 2 cases; in another case calculi were probably involved, while in the remaining patient either calculi or an old duodenal ulcer could account for the fistula. A barium meal passed into the biliary tract in 3 of these 4 patients, while a calculus was found in the duodenum of the 4th, suggesting the presence of a fistula. Radiological findings were suggestive of a duodenobiliary fistula in 1 case, but this could not be confirmed at surgery. In another case aerobilia and cholecystolithiasis were demonstrated radiologically but the patient refused surgery.

6424 ROLE OF GALLBLADDER IN GALLSTONE FORMATION.

(E.) Nakayama, F.; van der Linden, W. (Kyushu Univ. Fac. Health Sci., Fukuoka, Japan). *Acta Chir. Scand.* 139(1):45-49, 1974.

Bile composition before and after cholecystectomy was compared in cholelithiasis patients to assess the role of the gallbladder and to study the effect of cholecystectomy on hepatic bile. Most hepatic bile obtaine at laparotomy was oversaturated with cholesterol. Most gallbladder bile was not. The first finding is likely due to functional interruption of the enterohepatic circulation of bile salts during overnight fast prior to operation. After cholecystectomy and reestablishment of the enterohepatic circulation, hepatic bile was stabilized in terms of cholesterol solubility. This agrees with the fact that recurrence of cholesterol gallstones is seldom seen after cholecystectomy and stresses the importance of the gallbladder in the formation of gallstones. After cholecystectomy and reestablishment of the enterohepatic circulation, hepatic bile contained less deoxycholic acid than before. This indicates a more efficient enterohepatic circulation with less bile salt spillover into the colon. This gain in efficiency may compensate for diminished bile salt pool size, and the bile salt level in bile can be held sufficiently high for the solubilization of cholesterol. Thus, in the absence of a gallbladder, a diminished bile acid pool size does not necessarily lead to cholesterol supersaturation and gallstone formation.

6425 ACUTE CHOLECYSTITIS WITH AN OCCLUDING THROMBUS OF THE CYSTIC ARTERY. *(E.)* Sjodahl, R.; Wetterfors, J. (Univ. Hosp., Linkoping, Sweden). *Acta Chir. Scand.* 140(1):77-81, 1974.

6426 CHOLEDOCHAL CYST. A CASE OPERATED WITH EXCISION AND ANATOMICAL RECONSTRUCTION. *(E.)* Cahlin, E.; Lundholm, K.; Sahlin, O.; Schersten, T. (Lidkoping Hosp., Goteborg, Sweden). *Acta Chir. Scand.* 140(2):161-163, 1974.

6427 NON-MALIGNANT GALLBLADDER DISEASE IN THE AGED. *(E.)* Andersson, A.; Bergdahl, L.; Boquist, L.; Nystrom, B. (Dept. Surg., Univ. Umea, Sweden). *Acta Chir. Scand.* 140(3):242-245, 1974.

6428 TRAUMATIC FALSE ANEURYSM OF THE RIGHT HEPATIC ARTERY WITH RUPTURE INTO THE DUODENUM: AN UNUSUAL COMPLICATION OF BILIARY SURGERY. *(E.)* Halvorsen, J. F.; Semb, B. K. H. (Haukeland Hosp., Univ. Bergen, Norway). *Acta Chir. Scand.* 140(3):252-254, 1974.

6429 NONOPERATIVE ROENTGENOLOGIC INSTRUMENTATION TECHNICS OF THE POSTOPERATIVE BILIARY TRACT. TREATMENT OF BILIARY STRICTURE AND RETAINED STONES. *(E.)* Burhenne, H. J. (Children's Hosp., San Francisco, Calif.). *Am. J. Surg.* 128(1):111-117, 1974.

6430 ECTOPIC DRAINAGE OF THE COMMON BILE DUCT. *(E.)* Quintana, E. V.; Labat, R. (Sch. Med., Univ. Puerto Rico, San Juan). *Ann. Surg.* 180(1):119-123, 1974.

6431 CLASSIC CHOLELITHIASIS AND CHOLEDOCHOLITHIASIS IN A 10-YEAR-OLD GIRL. *(E.)* Moffat, R. C. (no affil.). *Can. J. Surg.* 17(3):152-154, 1974.

6432 ABNORMALITIES OF CHOLECYSTOKININ SECRETION AND GALLBLADDER EMPTYING IN COELIAC DISEASE. *(E.)* Low Beer, T. S.; Harvey, R. F.; Nolan, D.; Davies, E. R.; Read, A. E.(Bristol Royal Infirm., England). *Gut* 15(4):337, 1974.

6433 THE EFFECTS OF DIFFERENT DOSES OF CHENODEOXYCHOLIC ACID AND OF WITHDRAWING TREATMENT ON BILE LIPID COMPOSITION AND LIVER FUNCTION IN PATIENTS WITH GALLSTONES. *(E.)* Mok, H. Y. I.; Bell, G. D.; Dowling, R. H. (Royal Postgrad. Med. Sch., London, England). *Gut* 15(4):340, 1974.

6434 CRITICAL EVALUATION OF IMPROVED SURGICAL METHODS IN CHOLEDOCHAL EXPLORATION. *(E.)* Reiss, R.; Pikielny, S.; Antal, C. (Meir Gen. Hosp., Kfar Saba, Israel). *Int. Surg.* 59(3):156-158, 1974.

6435 HEPATIC PORTOENTEROSTOMY - IS IT INDICATED IN THE TREATMENT OF BILIARY ATRESIA? *(E.)* Campbell, D. P.; Poley, J. R.; Bhatia, M.; Smith, E. I. (Univ. Oklahoma Health Sci. Ctr., Oklahoma City). *J. Pediatr. Surg.* 9(3):329-334, 1974.

6436 SUCCESSFUL USE OF THE GALLBLADDER TO ESTABLISH DRAINAGE IN A CASE OF EXTRAHEPATIC BILIARY ATRESIA. *(E.)* Foianini, J. E.; Rodriguez, A. (El Paso, Tex.). *J. Pediatr. Surg.* 9(3):413-414, 1974.

6437 ACTIVITY OF ALANINE AMINOTRANSFERASE AND ITS ISOENZYMES IN DISEASE OF BILIARY TRACT AND PANCREAS. *(Pol.)* Chrostkowski, K.; Chustecki, S.; Szczepanowska, R. (Ctr. Postgrad. Med. Educ., Warsaw, Poland). *Przegl. Lek.* 30(2):253-255, 1973.

6438 HISTOCHEMICAL STUDIES OF GASTRIC MUCOSA IN PATIENTS WITH CHRONIC CHOLECYSTITIS. *(Pol.)* Zimnoch, L.; Prokopczuk, J.; Musiatowicz, B.; Popow, J.; Gabryelewicz, A. (Acad. Med., Bialystok, Poland). *Przegl. Lek.* 30(2):255-258, 1973.

6439 CHANGES IN GASTRIC SECRETORY FUNCTION IN PATIENTS WITH CHRONIC CHOLECYSTITIS. *(Pol.)* Badurski, J.; Glowacka, D.; Sarosiek, J.; Musiatowicz, B.; Gabryelewicz, A.; Zimnoch, L.; Zarzycki, W.; Popow, J. (Acad. Med., Bialystok, Poland). *Przegl. Lek.* 30(2):259-262, 1973.

6440 EFFECT OF ACIDIFICATION OF DUODENUM ON EXCRETION AND SECRETION OF BILIRUBIN IN PATIENTS WITH CHRONIC CHOLECYSTITIS. *(Pol.)* Gabryelewicz, A.; Szalaj, W.; Laszewicz, W. (Acad. Med., Bialystok, Poland). *Przegl. Lek.* 30(2):262-264, 1973.

6441 STUDIES ON FREQUENCY OF ASSOCIATION BETWEEN DISEASES OF THE BILIARY SYSTEM AND PANCREAS. *(Pol.)* Chylinski, J.; Adrich, Z. (Inst. Internal Med., Gdansk, Poland). *Przegl. Lek.* 30(2):264-266, 1973.

6442 SURGICAL TREATMENT OF ACUTE CHOLECYSTITIS. *(Pol.)* Alichniewicz, A.; Czajowski, J.; Berner, J.; Olejnik, J.; Czerucki, W.; Szuflet, Z. (Acad. Med., Lodz, Poland). *Przegl. Lek.* 30(2):268-270, 1973.

6443 DIFFICULTIES IN DIAGNOSIS OF ACUTE CHOLECYSTITIS WITH CONCOMITANT ACUTE PANCREATITIS. *(Pol.)* Bernacki, E.; Dadan, H.; Szelag, E. (Acad. Med., Bialystok, Poland). *Prezgl. Lek.* 30(2):270-272, 1973.

6444 CONCOMITANCE OF CHOLELITHIASIS WITH DUODENAL ULCER. *(Pol.)* Puchalski, Z.; Tolloczko, A.; Dzienis, H.; Barczyk, J. (Acad. Med., Bialystok, Poland). *Przegl. Lek.* 30(2):274-275, 1973.

6445 ETIOLOGY OF THE POST-CHOLECYSTECTOMY SYNDROME. *(Pol.)* Dabrowski, A.; Szelachowska, E.; Wasielica, M. (J. Sniadecki Provincial Hosp., Bialystok, Poland). *Prezgl. Lek.* 30(2):276-277, 1973.

6446 QUANTITATIVE DETERMINATION OF BILE ACIDS AND THEIR CONJUGATES USING THIN-LAYER CHROMATOGRAPHY AND A PURIFIED 3α-HYDROXYSTEROID DEHYDROGENASE. *(E.)* Fausa, O.; Skalhegg, B. A. (Univ. Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(3):249-254, 1974.

6447 TREATMENT OF CHOLEDOCHOLITHIASIS AND INTRAHEPATIC CHOLELITHIASIS WITH COMBINED CHINESE TRADITIONAL AND WESTERN MEDICINE BY GENERAL ATTACK THERAPY ("GAT") FOR THE EXPULSION OF STONE. *(E.)* Juei Lin, H.; Juei Chang, C.; Yung Tian, C. (Zunyi Med. Coll., Kweichow, China). *Sci. Sinica* 17(2):289-292, 1974.

6448 MICROFLORA OF THE BILE IN CHRONIC DISEASES OF THE GALLBLADDER AND BILE DUCTS. *(Rus.)* Orzhonikidze, Z. V.; Kurashvili, V. E.; Salakaia, R. G. (Tbilisi Inst. Postgrad. Med., USSR). *Soobshch. Akad. Nauk Gruzinsk. SSR* 73(3):693-696, 1974.

6449 CONDITION OF THE PANCREAS IN PATIENTS WITH CHRONIC CHOLECYSTITIS. *(Rus.)* Shlevkov, B. A.; Kol'tsov, P. A. (I. M. Sechenov 1st Moscow Med. Inst., USSR). *Sov. Med.* 36(6):145-146, 1973.

6450 SURGICAL HAZARDS OF CO-EXISTING ANOMALIES IN BILIARY ATRESIA. *(E.)* Lilly, J. R.; Chandra, R. S. (Children's Hosp. Natl. Med. Ctr., Washington, D.C.). *Surg. Gynecol. Obstet.* 139(1):49-54, 1974.

6451 PANCREATIC NECROSIS AND BILE TRACT DISEASES. *(Pol.)* Wlodarczyk, D.; Szymkowiak, K.; Gronowski, B. (K. Marcinkowski Munic. Hosp., Inowroclaw, Poland). *Wiad. Lek.* 26(14):1305-1307, 1973.

6452 A CASE OF CONGENITAL ABSENCE OF GALL BLADDER. *(Pol.)* Dolinski, J.; Lawicki, B. (Acad. Med., Wroclaw, Poland). *Wiad. Lek.* 27(1):43-45, 1974.

6453 ACUTE TORSION OF GALL BLADDER. *(Pol.)* Czekanski, E.; Lukaszczyk, T. (Munic. Hosp., Mikalow, Poland). *Wiad. Lek.* 27(1):47-49, 1974.

6454 DISSOLUTION OF RETAINED CHOLESTEROL CALCULI IN THE COMMON BILE DUCT FOLLOWING CHOLECYSTECTOMY. *(E.)* Toouli, J.; Jablonski, P.; Watts, J. McK. (Dept. Surg., Monash Univ., Melbourne, Australia). *Aust. NZ J. Surg.* 44(1):77, 1974.

6455 THE CHARACTERIZATION OF CHOLESTEROL GALLSTONE DISSOLUTION. *(E.)* Tao., J. C. C. (Carnegie-Mellon Univ., Pittsburgh, Pa.). *Diss. Abs. Int.* [*B.*] 35(1):203, 1974.

6456 ATRAUMATIC REMOVAL OF COMMON DUCT STONES. *(E.)* Sandblom, P.; Halabi, M. (Dept. Surg., Univ. Lund. Sweden). *Surg. Gynecol. Obstet.* 139(2):249-251, 1974.

6457 THE DISSOLUTION OF INTRAHEPATIC GALLSTONES: A CASE STUDY. *(E.)* Jablonski, P.; Toouli, J.; Watts, J. McK (Dept. Surg., Monash Univ., Melbourne, Australia). *Aust. NZ. J. Surg.* 44(1):78, 1974.

6458 GALLBLADDER ECTOPIA. A REVIEW OF ANOMALIES OF POSITION. *(E.)* Blanton, D. E.; Bream, C. A.; Mandel, S. R. (Dept. Radiol., Univ. North Carolina, Chapel Hill). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(2):396-400, 1974.

6459 LOCALIZED DEFORMITY OF THE GALLBLADDER SECONDARY TO HEPATIC MASS LESIONS. *(E.)* Joffe, N.; Babenco, G. O. (Beth Israel Hosp., Boston, Mass.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(2):412-419, 1974.

6460 DISEASES OF THE BILE DUCTS. *(Fr.)* Toader, C. (Surg. Clin. III, Cluj, Rumania). *Chirurgie* 99(8):582-590, 1973.

6461 CYSTIC DUCT STUMP SYNDROME. *(It.)* Favia, G.; Biasiato, R.; D'Amico, D.; Passi, P. (Inst. Clin. Gen. Surg. Surg. Ther., Univ. Padua, Italy). *Acta Chir. Ital.* 29(2):231-243, 1973.

See also, 5874, 5881, 5928, 5989, 5994, 6013, 6016, 6021, 6022, 6023, 6027, 6028, 6029, 6030, 6044, 6165, 6328, 6407.

GENERAL

6462 STUDIES WITH TWO GASTRIN ANTISERA OF DIFFERENT SPECIFICITY FOR GASTRINS I AND II. *(E.)* Hansky, J.; Soveny, C.; Korman, M. G. (Prince Henry's Hosp., Melbourne, Australia). *Digestion* 10:97-107, 1974.

Two gastrin antisera with different specificity for gastrins I and II were compared by raioimmunoassay. One antiserum (AS 4) was produced in a rabbit by 3 i.m. injections of an emulsion of synthetic human gastrin I-bovine serum albumin conjugate with

Freund's adjuvant, to which fine charcoal was added followed by intrasplenic and i.p. injections and then further monthly i.m. injection for 5 months. The other antiserum (AS 35) was produced in a rabbit by repeated foot pad injection of the emulsion, followed by an i.m. boost 3 months after the last foot pad injection. AS 4 bound well with synthetic human gastrin I and porcine gastrin I, yet showed little cross-reactivity with porcine gastrin II, while AS 35 showed equal binding with porcine gastrins I and II and synthetic human gastrin I. Fasting serum gastrin levels in 49 normal control subjects, 53 patients with duodenal ulcer, 15 with gastric ulcer, 6 with pernicious anemia and 12 with Zollinger-Ellison syndrome were higher when measured with AS 35 than with AS 4. Levels in duodenal ulcer which were significantly lower than normal with AS 4, were normal or slightly higher than normal with AS 35. Responses of the various test groups to protein feeding, insulin hypoglycemia, and secretin injection were generally in the same direction with both antisera. This was not the case in some patients after complete truncal vagotomy whose serum gastrin in response to insulin hypoglycemia was unchanged with AS 4, but showed a small rise with AS 35. These results suggest that the form in which gastrin is secreted in duodenal ulcer disease may be as sulfated gastrin II rather than as non-sulfated gastrin I. Antibodies raised against gastrin II may shed more light on this hypothseis.

6463 USE OF LAPAROSCOPY IN THE DIAGNOSIS OF TUBERCULAR PERITONITIS. *(Sp.)* Hita Perez, J.; de Dios Vega, J.; Mino Fugarolas, G.; Diago Ferrero, A.; Mardomingo Varela, P.; Muro, J. (La Paz Munic. Sanitorium, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 41(8):875-886, 1973.

A diagnosis of chronic peritonitis, probably tubercular in origin, was established in 16 of 1728 laparoscopies. In addition, 2 patients had peritoneal carcinomatosis, but a tubercular etiology could not be completely ruled out in either case. These 18 patients consisted of 10 men and 8 women, aged 18-70 yr (mean age 37 yr). Laparoscopic signs suggestive of tuberculosis were (1) dull, hyperemic, congested peritoneum enlarged by fibrinous exudation, in some cases with white areas resembling the white of a hard-boiled egg; (2) foamy, greenish ascites fluid; (3) interserosal adhesions which occasionally anchored the intestinal loops, which were sometimes dilated, to the parietal peritoneum; and (4) circumscribed or diffuse nodules on the parietal and visceral peritoneum, surfaces of the liver and spleen, and adherent tracts. Of the 9 patients from whom peritoneal biopsies were taken, *Mycobacterium tuberculosis* was isolated from tuberculoid granulomas in 8. The 1 patient who was negative for *M. tuberculosis* was shown to have a sigmoid carcinoma by barium enema. Three of the 4 nonbiopsied patients, whose laparoscopic and clinical findings were considered indicative of tubercular peritonitis, responded to tuberculostatic agents; the remaining patient had to be transferred to another hospital for treatment of pulmonary tuberculosis. Of 3 patients who were only subjected to liver biopsy, 2 had signs of granulomatous hepatitis, with a caseous granuloma in 1; the remaining patient had no detectable lesions. The patient with the caseous granuloma had clinical symptoms of typhoid fever and improved on specific therapy. One of the other patients died of an adenocarcinoma of the colon which, at autopsy, was found to have metastasized to the liver, gallbladder, spleen, peritoneum and bladder, while the other patient had a mucous cystadenoma of the ovary. These findings illustrate how difficult it may be to establish or rule out a diagnosis of tubercular peritonitis.

6464 HYPERSECRETORY STATES OF THE PANCREAS: IMPLICATIONS FOR THE PHYSIOPATHOLOGY OF PANCREATIC INFECTION. *(Sp.)* Dreiling, D. A.; Greenstein, A.; Bordalo, O. (Mt. Sinai Sch. Med., New York, N.Y.). *G.E.N.* 27(3/4):205-211, 1973.

For 80 min after stimulation with secretin (1.0 U/kg i.v.), pancreatic secretion was studied in 44 patients with biliary cirrhosis, 39 with nonalcoholic cirrhosis, 94 with alcoholic cirrhosis, 11 with Zollinger-Ellison syndrome, 19 with hemochromatosis, and 257 normal controls. In patients with biliary and nonalcoholic cirrhosis, the mean values for the pancreatic and bicarbonate outputs were higher than those found in normal subjects, but these values did not fall outside the normal range. In patients with Zollinger-Ellison syndrome and hemochromatosis, values for mean pancreatic and bicarbonate outputs were higher than in normal subjects and were increased above the normal range. Values for pancreatic and bicarbonate outputs fell between these 2 groups in patients with alcoholic cirrhosis. These findings suggest that patients with biliary and nonalcoholic cirrhosis do not have pancreatic hypersecretion. Increases in the mean pancreatic and bicarbonate outputs may be due to an increase in the ductular mass in the liver. Pancreatic hypersection appears to be functional in Zollinger-Ellison syndrome and to result from an increase in the pancreatic ductular mass in hemochromatosis. Increased pancreatic secretion in alcoholic cirrhosis is interpreted as being due to increases in the ductular cell mass in both the pancreas and liver.

6465 THE NATURE AND SIGNIFICANCE OF HYPERAMYLASEMIA FOLLOWING OPERATION. *(E.)* Morrissey, R.; Berk, J. E.; Fridhandler, L.; Pelot, D. (Dept. Med., Univ. California, Irvine). *Ann. Surg.* 180(1): 67-71, 1974.

Since the diagnosis of acute postoperative pancreatitis is usually based on the presence of hyperamylasemia, the isoenzyme pattern of serum amylase elevation following various abdominal and nonabdominal operative procedures was studied in a randomly selected group of 110 patients. Total serum anylase activity was significantly elevated postoperatively in 11 (10%) of the patients: of 28 patients undergoing abdominal operations, 4 (14%) had amylase increases; of 82 patients with nonabdominal surgery, 7 (9%) showed serum amylase elevations. In 7 of the 11 patients showing postoperative serum amylase elevations, isoamylase analysis revealed that the rise was chiefly in the pancreatic-type isoamylase; in the other 4 patients, the elevation occurred principally in the salivary-type isoamylase. These findings indicate that postoperative hyperamylasemia appears surprisingly often, and serum amylase activity may rise even when the surgical procedure is extra-abdominal. Moreover, elevation of serum amylase activity after surgery is not necessarily an indication of pancreatitis and may reflect instead a rise in salivary-type isoamylase.

6466 POSSIBLE INFLUENCE OF VITAMIN B_{12}-BINDING ON THE INTESTINAL FLORA IN BREAST-FED INFANTS: II. CONTENTS OF UNSATURATED B_{12}-BINDING PROTEIN IN MECONIUM AND FAECES FROM BREAST-FED AND BOTTLE-FED INFANTS. *(E.)* Gullberg, R. (King Gustaf V Res. Inst., Stockholm, Sweden). *Scand. J. Gastroenterol.* 9(3):287-292, 1974.

The amounts and patterns of unsaturated B_{12}-binding proteins in feces from breast-fed and bottle-fed infants were compared. A total of 76 samples were collected from 22 infants aged 1-51 days. The unsaturated vitamin B_{12}-binding capacity values (ng B_{12} U/g of meconium or feces) obtained were a mean of 154 (range 2-1151) and a median of 49 in 21 samples from 15 infants aged 1-3 days; a mean of 273 (range 2-1300) and a median of 64 in 28 samples from 10 breast-fed infants aged 4-51 days; and a mean of 72 (range 0-468) and a median of 10 in 27 samples from 9 bottle-fed infants, aged 4-51 days. The known properties of the large molecular size B_{12}-binding protein and the estimated amounts of the protein in human digestive fluids and milk agree with the idea that the protein could exert a selective antimicrobial effect by competing with certain microorganisms for vitamin B_{12} or analogues of B_{12} in the gastrointestinal contents. The protein might thus interfere with a synergistic effect of microorganisms synthesizing vitamin B_{12} or analogues thereof on microorganisms requiring exogenous supply of such compounds. The B_{12}-binding protein in granulocytes and external secretions may be important in host-parasite interactions. It may also participate in defense mechanisms against opportunistic bacteria dependent on an exogenous supply of B_{12}.

6467 INTESTINAL ABSORPTION OF 25-HYDROXYCHOLECALCIFEROL. *(E.)* Stamp, T. C. B. (Roy. Natl. Orthopedic Hosp., London, England). *Lancet* (7873):121-123, 1974.

A single dose of 10 μg/kg of 25-hydroxycholecalciferol in propylene glycol or vegetable oil was administered p.o. to 12 healthy volunteers (7 males and 5 females, aged 19-42 yr) and 10 patients (2 males and 8 females, aged 23-75 yr) with disorders in calcium metabolism and/or gastrointestinal function. Diagnosis included partial gastrectomy (3) and 1 case each of visceral scleroderma, primary biliary cirrhosis, autoimmune hepatitis, carcinoma of the head of the pancreas, complete obstructive jaundice, classic vitamin D deficiency with osteomalacia, and primary hyperparathyroidism. Plasma levels of 25-hydroxyvitamin D were measured by radiostereoassay at intervals during the next 24 hr. The mean maximum rise in plasma 25-hydroxyvitamin D was 109 ng/ml in healthy subjects. This rise occurred either 4 or 8 hr after 25-hydroxycholecalciferol ingestion. Of the 10 patients, 5 had markedly abnormal results, clearly demonstrating the abnormalities of vitamin D absorption which can occur after partial gastrectomy, in small bowel disease, and in biliary dysfunction. A 25-hydroxycholecalciferol tolerance test may thus be of value in establishing the cause of osteomalacia in gastrointestinal disease. Response to treatment of the primary disease may also be monitored by this technique. The test provides either rapid initial therapy or a clear indication for parenteral vitamin D administration in biliary disease.

6468 SIDE EFFECTS OF A CYTOSTATIC TREATMENT ON THE GASTROINTESTINAL TRACT. *(E.)* Hartwich, G. (Med. Clin., Univ. Erlangen, Germany). *Acta Hepatogastroenterol.* 21(2):89-92, 1974.

6469 SERUM PROTEINS AND PLASMA FREE AMINO ACIDS IN SEVERE MALNUTRITION. *(E.)* Baertl, J. M.; Placko, R. P.; Graham, G. G. (Johns Hopkins Univ. Sch. Hygiene Pub. Health, Baltimore, Md.). *Am. J. Clin. Nutr.* 27(7):733-742, 1974.

6470 ELECTRON MICROSCOPICAL DIAGNOSIS OF LIPIDOSIS WITH THE USE OF RECTAL BIOPSY. *(E.)* Duckett, S.; Cracco, J.; Lublin, F.; Scott, T. (Jefferson Med. Coll., Philadelphia, Pa.). *Am. J. Dis. Child.* 127(5):704-705, 1974.

6471 INFILTRATIVE GASTROINTESTINAL DISEASE. *(E.)* Cryer, P. E.; Kissane, J. (Washington Univ. Sch. Med., Washington, D.C.). *Am. J. Med.* 57(1):127-134, 1974.

6472 CANCER OF THE COLON AND RECTUM VS. CANCER OF THE STOMACH AND ESOPHAGUS IN JAPAN. STATISTICAL REVIEW. *(E.)* Shindo, K. (Osaka Univ. Hosp., Japan). *Am. J. Proctol.* 25(3):45-58, 1974.

6473 SOME ASPECTS OF THE EPIDEMIOLOGY OF DIARRHEAL DISEASES IN COSTA RICA. *(Sp.)* Meza, R. E. (Fac. Med., Univ. Central Venezuela, Caracas). *Bol. Of. Sanit. Panam.* 76(5):406-419, 1974.

6474 POSTOPERATIVE CHEST INFECTION. *(E.)* Presley, A. P.; Alexander-Williams, J. (General Hosp., Birmingham, England). *Br. J. Surg.* 61(6):448-452, 1974.

6475 CLINICAL SPECTRUM AND CARRIER STATE OF NONTYPHOIDAL SALMONELLA INFECTIONS IN INFANTS AND CHILDREN. *(E.)* Kazemi, M.; Gumpert, G.; Marks, M. I. (Dept. Pediatr., McGill Univ., Montreal, Canada). *Can. Med. Assoc. J.* 110(11):1253-1257, 1974

6476 TREATMENT OF ADVANCED GASTROINTESTINAL CANCER WITH EMETINE. *(E.)* Moertel, C. G.; Schutt, A. J.; Hahn, R. G.; Reitemeier, R. J. (Mayo Clin., Rochester, Minn.). *Cancer Chemother. Rep.* 58(2):229-232, 1974.

6477 EFFECTS OF PATIENT SELECTION ON RESULTS OF PHASE II CHEMOTHERAPY TRIALS IN GASTROINTESTINAL CANCER. *(E.)* Moertel, C. G.; Schutt, A. J.; Hahn, R. G.; Reitemeier, R. J. (Mayo Clin., Rochester, Minn.). *Cancer Chemother. Rep.* 58(2):257-259, 1974.

6478 AN EVALUATION OF THE EFFECTIVENESS OF SIMETHICONE IN ACUTE UPPER GASTROINTESTINAL DISTRESS. *(E.)* Bernstein, J. E.; Schwartz, S. R. (Dept. Med. Res., Memphis, Tenn.). *Curr. Ther. Res.* 16(6):617-620, 1974.

6479 SURGICAL TREATMENT OF CHRONIC CONSTIPATION. *(Ger.)* Dobroschke, J.; Feustel, H.; Schwemmle, K. (Surg. Clin., Univ. Erlangen, Germany). *Deutsch. Med. Wochenschr.* 99(21):1125-1128, 1974.

6480 GASTROINTESTINAL FUNCTION IN WORKERS EXPOSED TO ULTRAHIGH FREQUENCY ELECTROMAGNETIC FIELDS. *(Rus.)* Kleiner, A. I. (Inst. Ind. Hyg. Occupational Dis., Khar'kov, USSR). *Gig. Tr. Prof. Zabol.* (2):15-18, 1974.

6481 UPPER GASTROINTESTINAL HAEMORRHAGE - A FIVE YEAR STUDY. *(E.)* Kaul, B. K.; Usupa, K. N. (Banaras Hindu Univ., Varanasi, India). *Indian J. Surg.* 35(6):275-282, 1973.

6482 MONITORING DIRECT INTRA-ARTERIAL VASOPRESSOR THERAPY FOR GASTROINTESTINAL BLEEDING. *(E.)* Cohn, B. E.; Filippone, D. R.; Mattey, W. E.; Cohn, J. D. (St. Barnabas Med. Ctr., Livingston, N. J.). *J. Med. Soc. N.J.* 71(6):473-476, 1974.

6483 EPIDEMIC OF CHOLERA EL TOR IN NAPLES, 1973. *(E.)* De Lorenzo, F.; Manzillo, G.; Soscia, M.; Balestrieri, G. G. (D. Cotugno Hosp. Infect. Dis., Naples, Italy). *Lancet* 1(7859):669, 1974.

6484 CLINICAL EVOLUTION OF DISEASES CAUSED BY Salmonella isangi. *(Rus.)* Bunin, K. V.; Brodov, L. E.; Tsoi, D. M.; Kuznetsov, V. S.; Malinina, N. P.; Mamon, A. P. (1st Moscow Med. Inst., USSR). *Sov. Med.* 36(5):17-21, 1973.

6485 SOME MODIFIED SEROLOGICAL TESTS FOR ASSESSING IMMUNOGENESIS IN CHOLERA. *(Rus.)* Kiseleva, I. E.; Domaradskii, I. V.; Rassudov, S. M.; Erokhin, E. P.; Shelokhovich, A. I.; Shoshiev, L. N.; Kiseleva, V. I.; Turchinov, G. A.; Taranova, V. N.; Ivanova, L. V. (1st Moscow Med. Inst., USSR). *Sov. Med.* 36(5):21-24, 1973.

6486 DISTRIBUTION OF TETRACYCLINE IN THE ORGANISM AND THE EFFECTIVENESS OF THIS PREPARATION IN VIBRIO-CARRIERS AND CHOLERA PATIENTS. *(Rus.)* Tumanov, F. A.; Timina, V. P.; Markova, A. I.; Burkin, V. S.; Efimova, T. S., Minkov, G. B.; Goncharov, N. S. (Central Sci. Res. Inst., Epidemiol., Moscow, USSR). *Sov. Med.* 36(5):24-27, 1973.

6487 DISTURBED ABSORPTIVE FUNCTION OF THE SMALL INTESTINE AND OF THE PARIETAL DIGESTION IN PATIENTS WITH ACUTE DYSENTERY. *(Rus.)* Iuschuk, N. D. (Central Sci. Res. Inst. Epidemiol., Moscow, USSR). *Sov. Med.* 36(5):27-30, 1973.

6488 RENAL HEMODYNAMIC DISORDERS IN FOOD POISONING CAUSED BY SALMONELLA. *(Rus.)* Liashuck, A. I. (no affil.). *Sov. Med.* 36(5):43-45, 1973.

6489 SOME CLINICO-EPIDEMIOLOGICAL TRAITS OF DYSENTERY PROVOKED BY VARIOUS ENZYMATIC SONNE-SHIGELLA TYPES. *(Rus.)* Krivda, Y. G.; Chuprynina, A. A.; Malygin, A. V.; Deviatova, L. N.; Shapiro, S. L.; Paperno, M. E. (I. M. Sechenov 1st Moscow Med. Inst., USSR). *Sov. Med.* 36(5):46-50, 1973.

6490 CLINICAL FEATURES OF BACTERIAL DYSENTERY IN WORKERS IN THE FOOD INDUSTRY AND IN PRESCHOOL INSTITUTIONS FOR CHILDREN. *(Rus.)* Koval'skaia, T. V. (Munic. Hosp. Infectious Dis., Khabarovsk, USSR). *Sov. Med.* 36(5):50-53, 1973.

6491 ON INCREASING THE EFFECTIVENESS OF TREATMENT IN PATIENTS WITH TYPHOID FEVER AND OTHER INFECTIOUS DISEASES. *(Rus.)* Ipatova, N. N.; Martynov, S. V. (Ryazan Med. Inst., USSR). *Sov. Med.* 36(5):66-69, 1973.

6492 THE SIGNIFICANCE OF THE INTRADERMAL VITYPHIN TEST IN DIAGNOSING THE TYPHOID CARRIER STATE. *(Rus.)* Maltseva, A. N. (N. I. Pirogov 2nd Moscow Med. Inst., USSR). *Sov. Med.* 36(5):69-72, 1973.

6493 CLINICAL PICTURE OF DISORDERS PRODUCED BY THE ENTEROPATHOGENIC Escherichia coli 0124:K72 (B17). *(Rus.)* Raize, F. E. (Central Inst. Postgrad. Med., Moscow, USSR). *Sov. Med.* 36(5):98-102, 1973.

6494 ON THE PATHOGENESIS OF PAIN AND MUSCLE GUARDING IN TRUE AND SPURIOUS ACUTE ABDOMEN. *(Rus.)* Podonenko-Bogdanova, A. P. (Donetsk Med. Inst., USSR). *Sov. Med.* 36(6):116-119, 1973.

6495 SOME ASPECTS OF MODERN SALMONELLOSIS EPIDEMIOLOGY. *(Rus.)* Kilesso, V. A.; Bolotovskii, V. M. (no affil.). *Sov. Med.* 36(5):128-132, 1973.

6496 MULTIPLE BLEEDING LESIONS IN THE UPPER PART OF THE GASTROINTESTINAL TRACT. *(Rus.)* Smagin, V. G.; Sokolov, L. K.; Gavrilenko, V.; Ivanov, V. F.; Panchenkov, N. R. (no affil.). *Sov. Med.* 36(6):8-11, 1973.

6497 COMPARISON OF ANTIGENIC PROPERTIES OF IMMUNOGLOBULINS IN HUMAN INTESTINAL CONTENTS WITH HOMOLOGOUS SERUM IgG, IgA, AND IgM. *(Rus.)* Stefani, D. V.; Temkina, T. Ia.; Kuvaeva, I. B. (I. I. Mechnikov Res. Inst. Vaccines, Moscow, USSR). *Vopr. Med. Khim.* 19(1):8-11, 1973.

6498 RELATION BETWEEN THE LEVEL OF FREE AMINO ACIDS IN THE SERUM AND THE TYPE OF DEHYDRATION IN YOUNG CHILDREN WITH INTESTINAL TOXICOSIS. *(Rus.)* Sheibak, M. P.; Santalova, F. P. (Grodno Med. Inst., USSR). *Vopr. Okhr. Materin. Det.* 18(6):39-43, 1973.

6499 INTESTINAL INFECTIONS IN CHILDREN CAUSED BY PATHOGENIC STRAINS OF Escherichia coli. *(Pol.)* Gura, C.; Kazimierczyk, K.; Kopysc, Z. (Provincial Children's Hosp., Zielona Gora, Poland). *Wiad. Lek.* 26(14):1313-1318, 1973.

6500 EOSINOPHILIC ADENOMA OF THE PAROTID. *(Pol.)* Betkowski, A. (Dept. Otolaryngol., Health Care, Przemysl, Poland). *Wiad. Lek.* 27(1):55-56, 1974.

6501 ZOLLINGER-ELLISON SYNDROME. *(Pol.)* Palasz, M. (Provincial Hosp., Warsaw, Poland). *Wiad. Lek.* 27(2):137-141, 1974.

See also, 6014, 6045, 6132, 6209, 6226, 6334.

GENERAL

Parasitology

6502 HYPERINFECTION WITH Strongyloides stercoralis IN GREAT BRITAIN. *(E.)* Royle, G.; Fraser-Moodie, A.; Jones, M. W. (Hammersmith Hosp., London, England). *Br. J. Surg.* 61(6):498-500, 1974.

A 29-yr-old Jamaican woman presented with acute abdominal pain associated with vomiting, abdominal distension, and constipation. She had lived in England for 13 yr and had been shown to be a carrier of *Strongyleides stercoralis* 8 yr prior to her present illness, but no treatment had been instituted at that time. After a diagnosis of *S. stercoralis* was made, treatment with thiabendazole (25 mg/kg, twice daily) was instituted via a Ryle's tube. During therapy the SGOT rose from 12 to 76 U/liter and alkaline phosphatase rose from 26 to 350 U/liter. These later returned to normal. On day 15, a repeat biopsy showed regenerating mucosa with no larvae present. In this patient there was no apparent underlying condition. Her entire illness could be explained by reaction within the intestinal mucosa causing malabsorption and fluid and electrolyte imbalance. No evidence was noted of circulation of parasites and, in particular, no peripheral eosinophilia. A review of past cases indicates that all carriers of the nematode should be treated immediately, that no immigrant from an endemic area should be treated with corticosteroid or other immunosuppressives until the stools have been examined, and that diagnosis of *Strongyloides* hyperinfection should be considered in any immigrant with acute abdominal pain before laparotomy is undertaken. It is recommended that patients receive long courses of thiabendazole as a relapse may occur many months or even years later.

6503 HEPATIC ASCARIASIS. A CASE REPORT AND REVIEW OF THE LITERATURE. *(E.)* Saw, H. S.; Somasundaram, K.; Kamath, R. (Univ. Hosp., Kuala Lumpur, Malaysia). *Arch. Surg.* 108(5):733-735, 1974.

Although biliary ascariasis is common, the hepatic variety is rare. In this case report of hepatic ascariasis, a 2-yr-old Chinese boy in Malaysia passed large roundworms in stools on 4 occasions prior to admission for anorexia and fever associated with sweating. Laboratory findings included a total white cell count of 22,500/mm^2 (neutrophils, 77%, lymphocytes, 21%, and monocytes, 2%). Stool examination disclosed *Ascaris* ova, while an abdominal roentgenogram showed an enlarged liver but no other abnormality. At laparotomy, the liver was congested, with numerous linear areas of induration; these were incised and found to contain adult *Ascaris lumbricoides* worms. Liver biopsy revealed severe inflammation and fibrosis with many *Ascaris* ova in the tissue. All accessible, indurated areas were incised and the ascarids evacuated. After surgery, the child was given a 4-day course of piperazine citrate therapy (750 mg/day p.o.) to eradicate residual worms in the liver. Large numbers of adult *Ascaris* worms were passed by the rectum starting on postoperative day 6, but the child continued to have a high, oscillating temperature. Diethylcarbamazine citrate (20 mg 3 times/day p.o.) was then given for 3 weeks, at which time the temperature subsided and the patient's general condition improved. One yr after discharge the child has had no recurrence of symptoms. Whether diethylcarbamazine therapy contributed to his clinical improvement is uncertain.

6504 STUDY OF MAGNESIUM METABOLISM IN PARASITIC DISEASES OF THE COLON IN FLIGHT PERSONNEL. *(Fr.)* Pesquies, P.; Pannier, R.; Bon, R.; Girod, F. X.; Hadni, J. C. (Res. Ctr. Aviation Med., Paris, France). *Rev. Med. Aeronaut. Spatiale* 12(46):234-236, 1973.

An analysis was made of electromyogram tracings, plasma and erythrocyte magnesium, and whole blood calcium values in 22 male flight personnel with chronic parasitic diseases of the colon and symptoms of latent spasmophilia (lipothymia, feeling of a lump in the esophagus, thoracic oppression, etc.) and in 145 controls. All subjects examined were aged 25-50 yr. A significant increase in the frequency and intensity of repetitive electromyographic anomalies was found among the patients (68% compared with 9% among controls). Although no significant differences in plasma magnesium or whole blood calcium were found between patients and controls, erythrocyte magnesium concentrations were significantly decreased in patients (4.45 mEq/liter compared to 4.82 mEq/liter among controls). Thus, neurovegetative disorders observed in these patients may be due to a magnesium deficiency. Since latent spasmophilia in these patients might become manifest with spontaneous hyperventilation which is common among flight personnel, it is recommended that treatment of parasitic diseases of the colon be combined with a magnesium supplement (5 mg/kg/day Mg^{++}p.o.), a magnesium-binding agent such as pyridoxine, and a sedative for neuromuscular hyperexcitability.

6505 A CASE OF AMOEBIASIS OF THE RECTUM. *(E.)* Rossi, L. F. A. (Queen Mary's Hosp., London, England). *Br. J. Clin. Pract.* 28(6):212-214, 1974.

See also, 5932, 6202, 6298, 6321, 6322, 6335, 6337.

GENERAL

Regional Enteritis

6506 STUDIES ON CROHN'S DISEASE. III. CONCENTRATIONS OF IMMUNOGLOBULINS G, A, AND M IN THE MUCOSA OF THE TERMINAL ILEUM. *(E.)* Persson, S. (Regional Hosp., Orebro, Sweden). *Acta Chir. Scand.* 140(1):64-67, 1974.

Concentrations of immunoglobulins G, A. and M were measured by radial immunodiffusion in serum and homogenized·mucosa from the terminal ileum of 10 patients with Crohn's disease (4 men and 6 women, aged 19-46 yr) and 6 control patients (4 men and 2 women, aged 25-77 yr). Compared with controls, immunoglobulins were markedly increased in tissue homogenates from subjects with Crohn's disease, but serum immunoglobulin concentrations were within normal ranges. IgG concentrations were higher than IgA and IgM concentrations in patients with Crohn's disease and in controls. In Crohn's disease, the mean tissue concentration of IgG was 1.99 mg/g tissue *versus* 0.8 mg/g for IgA and 0.88 mg/g for IgM. These results are in agreement with an earlier study showing an overall increase in immunoglobulin-containing cells, particularly IgG-containing cells, in the terminal ileum of patients with Crohn's disease. The data indicate that there is a local immune response in the inflamed intestinal tissue of patients with Crohn's disease.

507 A STUDY OF PERIPHERAL LEUCOCYTE MIGRATION IN AGAROSE MEDIUM IN INFLAMMATORY BOWEL DISEASE. *(E.)* Bartnik, W.; Swarbrick, E. T.; illiams, C. (St. Mark's Hosp., London, England). *ut* 15(4):294-300, 1974.

ntigens of *Escherichia coli* 014 share determinants ith colonic antigens extractable from germ-free astrointestinal mucins, suggesting bacterial antiens play a role in cell-mediated immune mechanisms which may be involved in the pathogenesis of ulcerative colitis and Crohn's disease. The present work was carried out to determine whether the common antigen of Kunin, known to be present in *E. coli* 014 and to be related to antigens deriving from germ-free rat colon or feces, might show reactivity with sensitized leukocytes by inhibiting their migration in agarose medium. Such sensitized leukocytes might be expected in patients with ulcerative colitis. An attempt was also made to find a simple immunological test to distinguish ulcerative colitis from Crohn's disease. Antigens other than that of Kunin which were tested included an extract from germ-free rat feces and a Kveim suspension from sarcoid spleen K19. Inhibition of migration was obtained only with the Kunin antigen. It was observed in 11 out of 20 patients with ulcerative colitis and in 4 of 20 patients with Crohn's disease, but in only 1 of 33 controls. The occurrence and degree of migration inhibition appeared to be related to the activity of ulcerative colitis. Although leukocyte migration inhibition with Kunin antigen was almost 3 times as frequent in patients with ulcerative colitis as in those with Crohn's disease, the degree of inhibition was the same in both groups. It is clear that the test is not useful for distinguishing the 2 conditions. The observed lack of cellular reactivity to extract from germ-free feces and Kveim suspension contrasts with results obtained by other investigators using the capillary tube method. Results with the Kunin antigen support the hypothesis that a state of cellular immunity to enterobacterial common antigen may exist in inflammatory bowel disease.

6508 FAT-REDUCED DIET IN THE SYMPTOMATIC TREATMENT OF SMALL BOWEL DISEASE. METABOLIC STUDIES IN PATIENTS WITH CROHN'S DISEASE AND IN OTHER

PATIENTS SUBJECTED TO ILEAL RESECTION. *(E.)* Andersson, H.; Isaksson, B.; Sjogren, B. (Sahlgren Hosp. Goteborg, Sweden). *Gut* 15(5):351-359, 1974.

Eleven patients (6 men and 5 women, aged 19-61 yr) with Crohn's disease, of whom 9 had ileal resection, and 2 patients (a 52-yr-old man and a 63-yr-old woman) with small bowel resection for trauma and ileus were studied under metabolic ward conditions for an average period of 32 days. Most of these patients had chronic, severe diarrhea and varying degrees of steatorrhea; all were given 2 levels of fat intake: high-fat (100 g/day) for 2-4 days, followed by low-fat (40 g/day) for 16-24 days. On the high-fat diet, all patients showed watery diarrhea; but after the introduction of the low-fat diet, a marked reduction in number of stools and in fecal excretion of water and sodium occured in most patients, with 10 passing solid feces. Two other subjects improved only after the addition of cholestyramine (4 g 2-3 times/day). In 1 patient with colectomy and ileostomy, no improvement was seen. On the low-fat diet, there was a positive balance of nitrogen and potassium in many cases. Fecal fat excretion decreased to an average of 10 g/day from a mean of 23 g/day on the high-fat diet, but there was no change in the fractional absorption of fat. Clinical improvement was most marked in 6 patients with functioning gallbladders. In general, previous resection of the colon seemed to limit the reduction of fecal water and sodium excretion which followed the reduction in fat intake. These studies indicate that a fat-reduced diet can be recommended for symptomatic therapy of chronic diarrhea in patients with diseases of the ileum.

6509 ACUTE TOXIC DILATION OF THE COLON IN CROHN'S COLITIS. *(E.)* Buzzard, A. J.; Baker, W. N. W.; Needham, P. R. G.; Warren, R. E. (Gordon Hosp., London, England). *Gut* 15(5):416-419, 1974.

A study of case records of 190 patients with Crohn's disease seen over a 14-yr period revealed that 12 (6%) developed acute toxic dilation of the colon which was treated by total colectomy and ileorectal anastomosis. The mean age of these 12 patients (9 women and 3 men) was 29 yr at time of operation. All patients had been treated with systemic steroids, and in all 10 cases the duration of symptoms prior to the acute episodes was less than 2 yr. Clinical findings indicative of acute toxic dilation of the colon were preoperative oral temperatures above 100 F in 11 cases, a WBC over 10,000 in 8, a pulse rate over 120 in 10, and erythrocyte sedimentation rate over 30 mm/hr in 10. Dilation of the colon observed at operation was closely correlated with the maximum width (>10 cm) of the transverse colon measured in formalin-fixed sections. Fibrosis was present in the submucosa and subserosa but was definitely less evident in the transverse colon than in other parts, suggesting that steroids delayed the development of fibrous tissue in the most severely inflammed area. Only 4 patients still have successfully functioning ileorectal anastosomes at 8 months, to 8 yr. Four required a permanent ileostomy and 4 died. The preoperative sigmodoscopic appearance of the rectum was of no value in predicting the recurrence of disease.

6510 AN EXPERIMENTAL ANIMAL MODEL OF CROHN'S DISEASE. *(E.)* Cave, D. R.; Mitchell, D. N. (St. George's Hosp., London, England). *Gut* 15(4):345, 1974.

6511 ANTIBODY PRODUCTION TO THE BACTERIOPHAGE ϕX 174 IN PATIENTS WITH CROHN'S DISEASE. *(E.)* Bucknall, R. C.; Jones, J. V.; Peacock, D. B. (Frenchay Hosp., Bristol, England). *Gut* 15(4):345-346, 1974.

6512 THE INCIDENCE AND PREVALENCE OF CROHN'S DISEASE IN THE NOTTINGHAM AREA. *(E.)* Miller, D. S.; Keighley, A. C.; Backett, E. M.; Langman, M. J. S. (no affil.). *Gut* 15(4):346, 1974.

6513 ORAL LESIONS IN PATIENTS WITH CROHN'S DISEASE. *(E.)* Basu, M. K.; Asquith, P.; Thompson, R. A.; Cooke, W. T. (Dept. Oral Pathol., Univ. Birmingham, England). *Gut* 15(4):346, 1974.

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1975.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	It.	Italian
Ar.	Arabic	Jap.	Japanese
Bul.	Bulgarian	Kor.	Korean
Ch.	Chinese	Latv.	Latvian
Cz.	Czech	Lith.	Lithuanian
Dan.	Danish	Nor.	Norwegian
Dut.	Dutch	Pol.	Polish
E.	English	Por.	Portuguese
Eston.	Estonian	Rum.	Rumanian
Fin.	Finnish	Rus.	Russian
Fl.	Flemish	Ser.	Serbo-Croatian
Fr.	French	Sl.	Slovak
Ger.	German	Sp.	Spanish
Gr.	Greek	Sw.	Swedish
Heb.	Hebrew	Th.	Thai
Hun.	Hungarian	Turk.	Turkish
Ic.	Icelandic	Uk.	Ukrainian
In.	Indonesian	Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	mC,μC	milli-,microcurie(s)
ADP	adenosine diphosphate	mg	milligram(s)
AMP	adenosine monophosphate	min	minute(s)
ATP	adenosine triphosphate	ml	milliliter(s)
BSP	sulfobromophthalein	mm	millimeter(s)
C	degrees centigrade	MTD	maximum tolerated dose
cm	centimeter(s)	ng	nanogram (10^{-9})
CNS	central nervous system	pg	picogram (10^{-12})
cpm	counts per minute	p.o.	orally
DNA	deoxyribonucleic acid	ppm	parts per million
e.g.	for example	r	Roentgen
g	gram(s)	RBC	red blood cells (erythrocytes), red blood count
μg	microgram(s)		
hr	hour(s)	resp.	respectively
i.m.	intramuscular	Rev.	review (only in citations)
i.p.	intraperitoneal	RNA	ribonucleic acid
IU	international unit(s)	s.c.	subcutaneous
i.v.	intravenous	sec	second(s)
kg	kilogram(s)	SGOT	serum glutamic-oxalacetic transaminase
LD$_{50}$	median lethal dose(s)	SGPT	serum glutamic-pyruvic transaminase
LDH	lactic acid dehydrogenase	U	unit(s)
m	meter(s)	UV	ultraviolet
M	molar	WBC	white blood cells (leukocytes), white blood count
mEq	milliequivalent(s)		
mM	millimolar	yr	year(s)
μM	micromolar		

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

6517 QUANTITATIVE ULTRASTRUCTURAL STUDIES ON INHIBITED AND ON PARTLY STIMULATED GASTRIC PARIETAL CELLS.

(E.) Helander, H. F.; Hirschowitz, . I. (Dept. Anat., Univ. Umea, Sweden). *Gastroenterology* 67(3):447-452, 1974.

Six gastric fistula dogs, fasted overnight, were studied after inhibition of gastric acid secretion by atropine sulfate (80 μg/kg s.c.) and at the onset of secretion stimulated by constant i.v. infusion of histamine (50 μg/kg/hr). Gastric biopsies were taken 2 hr after inhibition of acid secretion and, with histamine infusion, during the transition from the resting to the secreting state. Morphometric data obtained from selected parietal cells in these dogs was compared with that obtained previously for dogs before, during, and after maximal histamine stimulation. The volume density of the mitochondria in atropine-inhibited and in presecretory dogs was about the same as in the resting and maximally stimulated dogs of the earlier study. However, the mitochondrial volume density was significantly lower in the partly stimulated dogs than in dogs biopsied 1 hr after maximal histamine stimulation. In the atropinized dogs, the surface densities of the secretory and tubulovesicular membranes were similar to the values previously obtained in resting dogs. In the partly stimulated dogs, the corresponding surface values were about the same as those for the posthistamine dogs. Surface densities of the nutrient membrane remained constant regardless of the functional state of the cells. In both studies, there was a delay in response after stimulation before gastric secretion started. At the end of this period, when secretion was minimal, significant morphological changes had already occurred. Therefore, the structural changes stimulated by histamine occur in the latent period before secretion starts.

6518 ACID MUCOSACCHARIDE-CONTAINING STRUCTURES IN THE GALL BLADDER EPITHELIUM OF THE RABBIT AS SEEN WITH THE ELECTRON MICROSCOPE.

(E.) Yamada, K. (Nagoya Univ. Sch. Med., Japan). *Histochemistry* 39(4):351-360, 1974.

Acid mucosaccharide containing ultrastructures in specimens of gallbladder epithelium treated with dialyzed iron, colloidal thorium, and ruthenium red were studied with the electron microscope. In epithelium stained with dialyzed iron, both extra- and intracellular ultrastructures were reactive. These included the surface coat of the plasma membrane, pinocytotic vesicles, granules of secretion, and certain elements of the Golgi apparatus. In the epithelial tissues stained by colloidal thorium or ruthenium red, the surface coat of the plasma membrane was the only ultrastructure which reacted positively for acid mucosaccharide. The present picture of ultrastructural elements containing acid mucosaccharides indicates a multiple function of the substances in rabbit gallbladder epithelium and correlates well with results of previous light and electron microscopic studies on the gallbladder epithelium of various vertebrate species.

6519 CIRCULAR MUSCLE LAYERS IN THE SMALL INTESTINE.

(E.) Duchon, G.; Henderson, R.; Daniel, E. E. (Dept. Pharmacol., Univ. Alberta, Edmonton, Canada). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 635-646.

Circular muscle layers from the small intestine of female mongrel dogs were examined by electron microscopy. Two layers were delineated: a main body of circular muscle and a more dense layer (6-12 cells thick) adjacent to the submucosa and containing smooth muscle cells which were more closely packed than those of the main body of muscle. The dense layer was almost completely separated from the rest of the circular muscle by a layer of nerve axons and connective tissue cells. No nexus (gap junctions) were observed between cells of the inner dense layer, while such contacts were numerous in the main outer layer. Nerve axons were rarely observed between cells in the dense layer but were abundant in the main circular muscle layer. Muscle cells of the main outer layer made occasional nexal contacts with cells of the intervening plexus layer, while muscle cells of the dense layer did not. The plexus layer contained unusual cells which in some portions resembled smooth muscle cells with typical actin filaments and plasmalemmal vesicles; in other portions, the plexus cells resembled Schwann cells or interstitial cells in their appearance and close applications to nerve axons. These hybrid cells formed gap junctions with the outer circular muscle layer. No nerve cell bodies were identified in the plexus. Axon varicosities were largely of two types: most consisted of small agranular vesicles typical of cholinergic nerves and some were large dense-cored granules. Results obtained after vagotomy and local denervation suggest that both pre- and postganglionic fibers, and perhaps afferent nerves, are present in this plexus.

6520 IMMUNOHISTOCHEMICAL AND ULTRASTRUCTURAL STUDIES ON THE ENDOCRINE POLYPEPTIDE (APUD) CELLS OF THE AVIAN GASTROINTESTINAL TRACT.

(E.) Polak, J. M.; Pearse, A. G. E.; Adams, C.; Garaud, J. C. (Hammersmith Hosp., London, England). *Experientia* 30(5):564-567, 1974.

The identification of endocrine cells, and the localization of the hormones gastrin, glucagon, secretin, vasoactive intestinal peptide (VIP), and gastric inhibitory peptide (GIP) were studied in the gut of the quail and White Leghorn chicken. The methods utilized were immunofluorescence and peroxidase-labeling. Gastrin and cerulein were found in cells of all regions except the proventriculus and cecum with only gastrin cells in the gizzard; secretin, in cells of the duodenum and 1st part of the jejunum; glucagon, in cells of the 2nd part of the duodenum, the jejunum, and the ileum; and VIP in cells of all regions except the gizzard. No GIP cells were found in any part of the G.I. tract. All endocrine cells were reactive with lead hematoxylin and Grimlius silver but not reactive with the Masson-Fontana method for enterochromaffin granules. This demonstrates that none of the hormones mentioned is present in the enterochromaffin cells, but all are present in argyrophil cells. Preliminary studies show that glucagon and secretin are stored in different cells. No distinction was found between glucagon and gastrin cells. Gastrin and cerulein reactin cells were identical. This data is in agreement with previous observations recorded on the distribution of gastrin, glucagon, secretin, and VIP in avian gut endocrine cells.

6521 MYO-FIBROBLASTS IN THE CIRRHOTIC LIVER. *(E.)* Irle, C.; Ryan, G. B.; Gabbiani, G.; Majno, G. (no affil.). *Experientia* 30(6):704, 1974.

6522 MORPHOMETRIC ANALYSIS OF THE ULTRASTRUCTURAL CHANGES IN THE LIVER OF AGING RATS. *(E.)* Schmucker, D. L.; Jones, A. L.; Mills, E. S. (San Francisco VA Hosp., Calif.). *J. Gerontol.* 29 (5):506-513, 1974.

6523 ANATOMY OF THE RECTUM AND ANAL CANAL OF THE RHESUS MONKEY (Macaca mulatta). *(E.)* Jit, I. (Postgrad. Inst. Med. Ed. Res., Chandigarh, India). *J. Anat.* 117(2):271-279, 1974.

6524 ULTRACRYOTOMY SHOWS THE CRYSTAE OF MITOCHONDRIA. *(E.)* Hodson, S.; Williams, L. (Welsh Natl. Sch. Med., Cardiff). *Experientia* 30 (7):834, 1974.

6525 HEPATIC CHROMAFFIN CELLS. *(E.)* Martinez, I.; Racotta, R.; Russek, M. (Natl. Sch. Biol. Sci., Natl. Polytech. Inst., Mexico City, Mexico). *Life Sci.* 15(2):267-271, 1974.

6526 COLCHICINE-INDUCED AUTOPHAGOCYTOSIS IN LIVER. *(E.)* Singh, A.; Le Marchand, Y.; Jeanrenaud, B.; Orci, L. (Sch. Med., Geneva, Switzerland). *Experientia* 30(6):709, 1974.

6527 CHOLERA TOXIN MIMICS MELANOCYTE STIMULATING HORMONE IN INDUCING DIFFERENTIATION IN MELANOMA CELLS. *(E.)* O'Keefe, E.; Cuatrecasas, P. (Johns Hopkins Univ. Sch. Med., Baltimore, Md.). *Proc. Natl. Acad. Sci. USA* 71(6):2500-2504, 1974.

6528 THE SUBPLASMALEMMAL MICROFILAMENTS IN KUPFFER CELLS. *(E.)* Singh, A. (Univ. Geneva Sch. Med., Switzerland). *J. Ultrastruct. Res.* 48(1):67-68, 1974.

6529 RESPONSE OF MOUSE INTESTINE TO NEUTRONS AND GAMMA RAYS IN RELATION TO DOSE FRACTIONATION AND DIVISION CYCLE. *(E.)* Withers, H. R.; Mason, K.; Reid, B. O.; Dubravsky, N.; Barkley, Jr., H. T.; Brown, B. W.; Smathers, J. B. (M. D. Anderson Hosp., Houston, Tex.). *Cancer* 34(1):39-47, 1974.

6530 A SPECIAL MUSCLE LAYER IN THE INTESTINAL MUSCULAR COAT. *(E.)* Gabella, G. (Dept. Anat., Univ. Coll. London, England). *J. Physiol. (Lond.)* 240(2):1P-3P, 1974.

6531 STUDIES ON HEPATOCYTE MEMBRANES UNDER NORMAL CONDITIONS AND IN CHOLESTASIS. *(E.)* Bernar M.; Bonvicini, F.; Galletti, G.; Gasbarrini, G.; Lenaz G.; Masotti, L.; Miglio, F.; Roda, E.; Silvestrini, M. G.; Toschi, M. (Inst. Chem., Univ. Bologna, Italy). *Rend. Gastroenterol.* 5(3):222-223, 1973.

6532 ULTRASTRUCTURAL DIFFERENCES ALONG THE COLONI MUCOSA OF THE MOUSE. *(E.)* Corriveau, M.; Devroede, G.; Hugon, J. S. (Med. Ctr., Univ. Sherbrook Canada). *Z. Anat. Entwicklungsgesch.* 144(1):75-83, 19

6533 THE ELEMENTAL STRUCTURE OF AUSTRALIA ANTIGEN IN THE PRESENCE AND ABSENCE OF ANTIBODIES. *(E.)* Pisi, E.; Muscatello, U.; Bianchi, F. B. (Inst. Pathol. Gen., Univ. Modena, Italy). *Rend. Gastroenter ol.* 5(3):218, 1973.

6534 CHANGES IN THE MEMBRANE STRUCTURES IN ACINAR CELLS. *(Rus.)* Permiakov, N. K.; Podol'skii, A. E.; Titova, G. P. (N. V. Sklifosovskii Sci. Res. Inst. Emergency Med. Treatment, Moscow, USSR). *Biull. Eksp. Biol. Med.* 77(4):121-125, 1974.

6535 PROLIFERATION AND AGING PROCESSES IN THE HUMAN SMALL INTESTINE. *(Ger.)* Rother, P. (Dept. Med., Karl Marx Univ. Leipzig, Germany). *Wissenschaftl. Z. Karl Marx Univ.* [*Math. Naturwissenschaftl. Reihe*] 23(1)70-72, 1974.

6536 ULTRASTRUCTURAL CHANGES IN SMOOTH MUSCLE CELLS FROM THE TUNICA MUSCULARIS OF THE GUINEA PIG ILEUM IN VITRO RESULTING FROM CHANGES IN FUNCTION. *(Ger.)* Lowe, H.; Grunewald, I.; Grochalski G. (Central Inst. Mol. Biol., Berlin, Germany). *Acta Biol. Med. Ger.* 32(2/3):219-233, 1974.

6537 INFLUENCE OF EXCESSIVE AND DEFICIENT VITAMIN B_2 ON THE CYTOARCHITECTURE OF MOUSE HEPATOCYTES. *(Ger.)* Rohr, U. A.; Riede, U. N.; Rohr, H. P. (Inst Pathol., Univ. Basel, Switzerland). *Beitr. Pathol.* 152(1):46-57, 1974.

6538 FEATURES OF BLOOD SUPPLY IN THE WALLS OF THE COLON AND SIGMOID. *(Rus.)* Baulin, A. A. (Kozlov Central Reg. Hosp., Pachelma Region, Penza Dis trict, USSR). *Vestn Khir.* 112(3):128-129, 1974.

See also, 6566, 6768, 6835, 6894, 6915, 7020.

39 ABSORPTION AND TRANSPORT OF PROTEIN FROM
THE PERITONEAL CAVITY.

(E.) Szabo, G.;
gyar, Z. (Natl. Inst. Traumatol., Budapest, Hun-
ry). *Acta Med. Acad. Sci. Hung.* 30(4):303-310,
73.

sorption of ^{131}I-albumin from the diaphragmatic
pect of the peritoneum, from the liver, and from
e intestinal serosa was measured in 58 mongrel
gs. Absorption from the diaphragm was slow. Af-
r 6 hours, only 1.6% of the introduced radioalbu-
n was recovered in the thoracic duct lymph, 1.9%
om the lymph flowing from the cannulated right
ct, and 8.6% from the circulating plasma, giving
total of 12.1% for diaphragmatic absorption. Com-
rison with animals with ligated right lymph trunk
early indicated that the lymphatics terminating on
e right side of the neck are probably the most im-
rtant pathway for the transport of the protein ab-
rbed at the peritoneal aspect of the diaphragm.
sorption from the liver surface was more rapid
an the diaphragm. After 6 hr the total amount in
asma and lymph was 50.5%. In animals with ligated
ght duct, recovery in plasma and lymph was 28% of
e introduced dose, indicating the importance of
e lymphatics on the right side of the neck. Prac-
cally no absorption was noted from the serosa of
e jejunum. These results indicate that liver sur-
ce is the most important site of protein absorp-
on from the abdominal cavity. These experiments
so suggest that protein may be removed from the
ritoneal space by absorption into blood capillar-
s. At the peritoneal aspect of the diaphragm, the
tio of venous *versus* lymphatic transport was 0.66
ile the same ratio for absorption from the liver
psule was 0.59, indicating that nearly 40% of the
tal absorbed protein entered directly into the
ood capillaries. The lymphatics joining the great
ins at the right side of the neck carried about
ice as much absorbed protein as did the thoracic
ct.

40 COMPETITION BETWEEN CARNOSINE AND OTHER
PEPTIDES FOR TRANSPORT BY HAMSTER JEJUNUM
VITRO.

(E.) Addison, J. M.; Matthews, D. M.;
rston, D. (Westminster Med. Sch., London, England).
in. Sci. Mol. Med. 46(6):707-714, 1974.

take of carnosine in the rings of everted hamster
junum incubated *in vitro* at 27 C was inhibited by
uimolar glycylglycine, glycylglycylglycine, glycyl-
rcosine, glycylproline, methionylmethionone and pro-
lhydroxyproline but not by the equivalent free ami-
acids, or by a mixture of β-alanine and histidine.
hibition of carnosine uptake by glycylproline was
mpetitive. Possibly carnosine and the dipeptides
hibiting its uptake enter the mucosal cells by a
mmon mechanism which is independent of the entry
chanisms for amino acids. Uptake of carnosine was
t inhibited by *N*-acetylglycylglycine or by glycyl-
ycine amide, suggesting that these substitutions
event glycylglycine from utilizing the dipeptide-
take mechanism. Carnosine uptake was not inhibited
equimolar lysyllysine or α-glutamylglutamic acid,
r did either lysyllysine or α-glutamylglutamic acid
fect uptake of each other. Though these results
e compatible with the existence of multiple dipeptide-uptake systems in the intestinal mucosa, the evidence presently available is insufficient to permit any conclusion on this point.

6541 FUNCTIONAL DIFFERENTIATION OF HUMAN JEJUNUM AND ILEUM: A COMPARISON OF THE HANDLING OF GLUCOSE, PEPTIDES, AND AMINO ACIDS.

(E.) Silk, D. B. A.; Webb, J. P. W.; Lane, A. E.; Clark, M. L.; Dawson, A. M. (St. Bartholomew's Hosp., London, England). *Gut* 15(6):444-449, 1974.

Absorption rates of the dipeptide glycyl-L-alanine and its constituent free amino acids from the human ileum were compared by *in vivo* perfusion techniques in 6 adult volunteers (aged 19-58 yr). The positioning of the perfusion tube was verified by measuring the differential jejunal and ileal handling of bicarbonate. Differences in jejunal and ileal amino acid absorption were compared with differences in glucose absorption from the same perfusion sites. Glucose was absorbed faster from the jejunum (25.5 ± 2.87 mM/hr/15 cm) than from the ileum (14.0 ± 2.0 mM/hr/15 cm), resulting in a 45.5% reduction in mean glucose absorption rate between the proximal jejunum and ileum. L-alanine was absorbed faster than glycine both in the jejunum and the ileum from the amino acid solution. Glycine was absorbed faster from the jejunum (48.1 ± 10.6 μM/min/15 cm) than from the ileum (21.4 ± 6.9 μM/min/15 cm), with a 55.5% reduction in mean glycine absorption rate between the proximal jejunum and the ileum. For 5 subjects the mean absorption rate of L-alanine from the ileum was 68.3 ± 14.8 μM/min/15 cm, a 37.3% reduction from the rate of absorption from the jejunum, 83.2 ± 12.3 μM/min/15 cm. No significant difference was obtained in the net absorption rates of glycine or L-alanine from the dipeptide solution when perfused in the ileum compared with the jejunum. The absorption of glycine was faster from the dipeptide solution than from the equivalent amino acid solution during both jejunal and ileal perfusions. L-alanine was absorbed at similar rates from the jejunum during perfusion of the dipeptide solution and the amino acid solution. However, during ileal perfusions, L-alanine was absorbed faster from the dipeptide solution. These studies support the existence of separate mechanisms for amino acid dipeptide transport in man. The observation that a peptide is absorbed at the same rate in the ileum as well as the jejunum, whereas amino acid uptake is depressed compared with the jejunum, could indicate that oligopeptide transport plays a major role in distal absorption of protein digestion products.

6542 THE EFFECT OF FASTING ON HEXOSE TRANSFER IN RAT INTESTINE.

(E.) Sanford, P. A.; Smyth, D. H. (Dept. Physiol., Univ. Sheffield, England). *J. Physiol. (Lond.)* 239(21):285-299, 1974.

Accurately defined segments of rat intestine were isolated *in vivo* and *in vitro* to study the effects of fasting on glucose and galactose transport in the proximal jejunum and distal ileum. In the *in vivo* experiments, the transport of glucose and galactose in the distal ileum was stimulated by fasting. The effect was specific as neither amino acid transport nor the permeability of the luminal membrane of the absorbing epithelium was altered by fasting. The increased hexose transport was accompanied by a reduced accumulation of hexose in the intestinal wall. Fasting did not stimulate hexose transport in the proximal jejunum. In the *in vitro* experiments, galactose transport in both the distal ileum and proximal jejunum was greater in fasted than in fed animals. Galactose transfer was stimulated by mannose to a greater extent in fasted than in fed animals, and the stimulation was greater in the proximal jejunum than in the lower ileum. In the presence of mannose, fluoride inhibited fluid and galactose transfer to a greater extent in fed than in fasted animals, in both the distal ileum and the proximal jejunum. In fed animals, fluoride had less effect on fluid and galactose transfer in the distal ileum than in the proximal jejunum. The importance of hexose metabolism to hexose transport was confirmed by *in vivo* experiments which showed that transport in the presence of fluoride was faster in fasted than in fed animals. Motility studies showed that phenol red introduced into the stomach reached the ileum sooner, achieved a higher concentration, and remained there longer in fasted than in fed animals. The increased absorptive capacity of the lower ileum during fasting could be a useful physiological adaptation. The depression of carbohydrate metabolism in the jejunum could also be a useful adaptation, as more hexose would be available for those organs more dependent on carbohydrate.

6543 THE TRANSAMINATION OF GLUTAMATE AND ASPARTATE DURING ABSORPTION IN VITRO BY SMALL INTESTINE OF CHICKEN, GUINEA-PIG AND RAT.

(E.) Parsons, D. S.; Volman-Mitchell, H. (Dept. Biochem., Univ. Oxford, England). *J. Physiol. (Lond.)* 239(3): 677-694, 1974.

The rates and extent of transamination of glutamate and aspartate were measured over periods of up to 90 min during absorption *in vitro* by the small intestine of rat, guinea-pig, and chicken. In the technique used, Krebs-Ringer-glucose-bicarbonate saline containing glutamate, aspartate, or both was circulated through the lumen of intestinal segments *in vitro*. The 'sweat' secreted at the serosal side of the segment was collected at regular intervals and the content of glutamate, aspartate, and other amino acids, especially alanine, determined. During absorption of dicarboxylic amino acids by rat small intestinal segments, alanine contributed 85% of the amino acids in the fluid secreted at the serosal surface. Similar measurements in guinea-pig and chicken intestine showed the alanine portion not to exceed 60%. For each species, a relation was found between the extent of dicarboxylic amino acid transamination to alanine and the total glutamic-pyruvic transaminase found in the intestinal mucosa. The proportion of alanine in the total amino acids appearing at the serosal surface was similar in the jejunum and ileum of both rats and guinea-pigs. The rate of appearance of alanine in serosal fluid was greater in the ileum than in the jejunum of the rat. It is suggested that in each species there is a limit to the amount of free dicarboxylic amino acids which the small intestinal mucosa can subject to transamination. However, it seems unlikely that during the digestion and absorption of a protein meal *in vivo*, the concentrations of free dicarboxylic amino acids in the intestinal lumen will ever exceed the concentrations needed to overload the transamination mechanism.

6544 EMBRYONIC CHICK INTESTINE IN ORGAN CULTURE: INTERACTION OF ADENYLATE CYCLASE SYSTEM AND VITAMIN D$_3$-MEDIATED CALCIUM ABSORPTIVE MECHANISM.

(E.) Corradino, R. A. (New York State Vet. Coll., Cornell Univ., Ithaca). *Endocrinology* 94(6):1607-1614, 1974.

Duodenum from 20-day-old chick embryos was maintaine in organ culture with excellent preservation of mucosal structure. Addition of vitamin D$_3$ (26 μM) to the medium increased duodenal cyclic AMP within 3 hr This increase preceded the induction of calcium-binding protein synthesis and stimulation of ^{45}Ca uptake by vitamin D$_3$. Following a decline to control level at 6 hr, cyclic AMP levels increased in parallel wit calcium-binding protein concentrations and ^{45}Ca uptake for the remainder of the 48-hr culture period. A metabolite of Vitamin D$_3$ (1,25-(OH)$_2$-D$_3$) stimulate cyclic AMP after a 48-hr incubation but at a much lower concentration. Dibutyryl cyclic AMP or theophylline (1 mM each) enhanced ^{45}Ca uptake regardless of the presence of vitamin D$_3$ in the medium, and the effect of these agents was additive. Enhancement was greater in the presence of vitamin D$_3$. Calcium-binding protein synthesis was reduced 50% by dibutyr cyclic AMP or theophylline alone, and 75% by both agents in combination. Stimulation of calcium uptake by dibutyryl cyclic AMP began within 3 hr and persisted for 48 hr, while inhibition of calcium-binding protein began only after 24 hr. The effect of this agent was not due to the butyrate since Na butyrate (1 mM) had no effect on calcium-binding protein synthesis or calcium uptake. Dibutyryl cyclic AMP alon resulted in increased total protein and DNA concentrations in cultured tissue and also stimulated mucosal to serosal transport of calcium. In the presence of vitamin D$_3$, the actions of both agents were essentially additive. Effects of the sterol on calcium uptake and translocation, and on calcium-binding protein synthesis, were completely abolished by actinomycin D (2 μg/ml). These results indicate an interaction involving vitamin D$_3$, calcium-binding protein, adenylate cyclase, and the intestinal calcium absorptive mechanism.

6545 PATTERNS OF VITAMIN B$_{12}$ ABSORPTION IN HUMANS MEDIATED BY HOMOLOGOUS AND HETEROLOGOUS INTRINSIC FACTORS.

(E.) Ranlov, P.; Rask-Madsen, J. (Glostrup Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(3):327-334, 1974.

The relative potencies of human gastric juice, dried hog pyloric mucosa, purified hog intrinsic factor, and rat gastric juice in the absorption of vitamin B$_{12}$ were studied in 27 normal subjects and in 6 patients with pernicious anemia. A paired radiolabel technique was employed by which homologous together with a heterologous intrinsic factor-vitamin B$_{12}$ complex was administered both p.o. and *via* tube directly into the intestine at various levels. Human and

intrinsic factors were equally effective in pro-
ing vitamin B_{12} absorption, regardless of the route
administration. In all subjects investigated sig-
icantly less vitamin B_{12} was absorbed when admini-
ered in complex with crude hog intrinsic factor, and
absorptive tendency decreased the more aboral the
paration was instilled. The poor performance of
crude hog preparation is attributed to its need to
s the upper intestinal tract to be available for
ecific B_{12} receptor sites in the ileum. This may be
plained as the need for proteolytic action on the
specific B_{12} binders. The use of crude hog stomach
eparations is questionable, particularly under con-
tions of impaired intestinal or pancreatic functions.
iable and easily standardized human intrinsic fac-
preparations are preferable.

46 THE EFFECT OF AMINO ACIDS ON THE INTESTINAL ABSORPTION OF IMMUNOGLOBULINS IN THE NEO-
TAL RAT. *(E.)* Bamford, D. R.; Donnelly, H. (Dept.
ol., Queen's Univ., Belfast, Ireland). *Immunology*
(1):151-158, 1974.

investigation was made to determine whether amino
ids which are actively transported and immunoglo-
lin G share common receptor sites during absorp-
on in 10-day-old Wistar rat ileum. The L-stereoiso-
rs of neutral amino acids (alanine, leucine, and
thionine) and histidine were absorbed against a
ncentration gradient from a 5 mM solution. Aspar-
c acid was not absorbed against a concentration
adient. Under anaerobic conditions with 100% ni-
ogen, the uptake of leucine and alanine was signi-
cantly reduced, and inhibition of leucine transport
curred in the presence of 0.2 mM 2,4-dinitrophenol.
ese results suggest that active processes for the
ansport of neutral and basic amino acids are al-
ady established in the ileum by 10 days postpartum.
e ileal absorption of ^{131}I-labeled rat IgG was sig-
ficantly greater than that of bovine IgG, confirm-
g the greater transport of the homologous protein
this *in vitro* system. The effect of relatively
gh concentrations of a number of neutral and charged
ino acids on the uptake of ^{131}I-labeled rat IgG
s examined. None of the neutral amino acids or as-
rtic acid significantly affected uptake. However,
th of the basic amino acids (lysine and arginine)
gnificantly stimulated the absorption of IgG.
imulation of protein uptake in the neonatal intes-
ine may be due to stimulation of pinocytosis by in-
eraction of positively charged molecules with the
lycocalyx on the apical cell membrane.

547 DRUG PERMEATION THROUGH MEMBRANES III: EFFECT OF pH AND VARIOUS SUBSTANCES ON PERM-
ATION OF PHENYLBUTAZONE THROUGH EVERTED RAT INTEST-
NE AND POLYDIMETHYLSILOXANE. *(E.)* Lovering, E. C.;
lack, D. B. (Drug Res. Branch, Hlth., Welfare Canada,
ttawa). *J. Pharm. Sci.* 63(5):671-676, 1974.

he permeation rate of phenylbutazone through membranes
f polydimethylsiloxane and everted intestine from male
prague-Dawley rats was measured over a range of pH
alues (5.00-7.40). The classical pH-partition hypothesis was not obeyed. Permeability coefficients were calculated using a modification of Higuchi's general equation relating pH and permeation rate. The effect of various substances on the permeability coefficient was determined. Phenylbutazone permeation rates in one or both membranes decreased in the presence of gelatin, methylcellulose, polyvinylpyrrolidone, skim milk, albumin, sodium lauryl sulfate, polysorbate 80, and cetrimonium bromide. Permeation rates through everted intestine were enhanced by bile salt concentrations below the critical micelle concentration and by porcine mucin, while rates through polydimethylsiloxane were unaffected. Substances having no apparent effect were: lactose, starch, talc, kaolin, calcium chloride, acacia, calcium sulfate, sucrose, sodium saccharin, cholesterol, ferrous sulfate, and magnesium stearate. None of the excipients examined significantly affected the permeation of phenylbutazone when present in concentrations liable to be used in formulating a drug. Interactions with a number of other materials found in the gastrointestinal tract occurred but these materials cannot be avoided *in vivo*.

6548 EFFECT OF HEMORRHAGE ON ELECTRICAL AND pH GRADIENTS IN THE INTACT STOMACH OF THE SUBHUMAN PRIMATE. *(E.)* Ritchie, Jr., W. P. (Univ. Virginia Med. Ctr., Charlottesville). *Gastroenterology* 67(2):259-263, 1974.

In 6 rhesus monkeys of both sexes (*Macaca mulatta*), cannulation of an acid test solution into their innervated intact stomachs was performed to monitor electrical potential differences (mV) generated by the gastric mucosa, and to assess net fluxes of water (ml), and of H^+, Na^+, and K^+ (μEq) at the end of a 3-hr period of hemorrhagic shock and again 3 hr after reinfusion of the shed blood. In addition, the effect of anesthesia alone on potential differences was measured over a 6-hr period in 4 control rats anesthetized with 0.1 mg/kg phencyclydine-HCl i.m., supplemented by 0.01 mg/kg given every 2.5 hr. In a further study, acid test solution containing 10 mM sodium taurocholate, a known agent for impairing the gastric mucosal barrier, was introduced into the stomachs of 4 controls. The resting state potential differences ranged from -43 to -49 mV; levels after hemorrhage, after reinfusion, and with anesthesia alone showed no significant alterations. Taurocholate caused a prompt fall in potential difference but values returned to base-line levels within 35 min after taurocholate evacuation from the stomach. In the basal state, a net gain of water, Na^+, and K^+, as well as a net loss of H^+ were observed. Neither hemorrhage nor subsequent reinfusion produced any significant changes, but taurocholate administration caused statistically significant increases in both the gains (water, Na^+, and K^+) and the H^+ loss of basal levels. The data indicate that in subhuman primates neither hemorrhage nor subsequent reinfusion of shed blood is associated with any significant changes in the ability of the intact stomach to maintain potential differences and pH gradients. These results do not substantiate the belief that acute posttraumatic hemorrhagic gastritis in humans is a consequence of an incompetent gastric mucosal barrier.

6549 AN EVERTED GUT POUCH TECHNIQUE WITH SIMULATED PERISTALSIS. *(E.)* Ghafoor, A.; Hartman, G. C.; Seddon, R. M.; Walker, R. (Dept. Biochem., Univ. Surrey, Guildford, England). *Biochem. Soc. Trans.* 2(3):545-547, 1974.

An 8-10 cm section of rat jejunum or upper ileum was everted with the proximal end tied to the glass cannula and the distal end ligated. The apparatus was arranged with two assemblies operating in parallel off the same gas cylinder and through a common outlet tube. The mucosal and serosal solutions of amino acids were initially of the same composition. Gas was bubbled through the mucosal solution, *via* the humidifier, then released into the atmosphere through peristalsis tubing. This tubing was periodically occluded by a motor-driven cam leading to a pressure pulse on the mucosal side. The serosal side was exposed to atmospheric pressure and thus these pulses led to a rhythmic contraction and expansion of the gut pouch. During contraction, serosal fluid was forced up the cannula and into contact with the aerating probe, serving both to mix serosal contents and facilitate serosal aeration. D- and L-Alanine were used to compare this technique with the gut sac technique of Wilson and Wiseman. The uptake of L-alanine was significantly greater than the D isomer in both procedures. Histological examination of tissues after 1-hr incubation showed far less overt damage in the gut pouch preparation than in the gut sac, and this was reflected in a significantly greater active transport for the L-amino acid. These factors, coupled with the ease of sampling, suggest this modified technique may be advantageous over other methods.

6550 CONTINUOUS RECORDING OF MULTIPLE PARAMETERS DURING PERFUSION OF HUMAN COLON. *(E.)* Chauve, A.; Devroede, G.; Sasseville, J. L. (Gastrointest. Res. Unit., Univ. Sherbrooke, Quebec, Canada). *J. Appl. Physiol.* 37(2):241-246, 1974.

A technique was developed to allow continuous recording of intraluminal pressure and potential difference during steady-state conditions of colonic perfusion in man. The method demonstrated the simplicity of pressure waves in the perfused right colon and permits simultaneous study of potential difference and movement of water and electrolytes. The technique was demonstrated on 8 male volunteers (aged 19-25 yr). During colonic perfusion with isotonic saline (15 ml/min), after establishing steady-state conditions, a potential difference of 17.4 mV was noted in the right colon, mucosa being negative. Impedence of the system varied little during the experiments but in the same individual potential difference fluctuated with time and was markedly influenced by the perfusion. Pressure waves were simple and periodic. Their amplitude ranged from 11.1-25.4 cm H_2O; their duration, 16-35 sec; and their frequency, 0.10-0.90 wave/min. They were accompanied by a subjective impression of contraction in the right iliac fossa. This method permits control of more variables during the study of potential difference and colonic pressure.

6551 KINETICS OF BILE SALT TRANSPORT BY THE PERFUSED RAT LIVER. *(E.)* Reichen, J.; Paumgartner, G. (Dept. Clin. Pharmacol., Univ. Berne, Switzerland). *Experientia* 30(6):682-683, 1974.

6552 SODIUM TRANSPORT IN ISOLATED VESICLES OF BRUSH BORDER MEMBRANE. *(E.)* Murer, H.; Hopfer, U. (Lab. Biochem., Fed. Tech. Univ. Zurich, Switzerland). *Experientia* 30(6):689, 1974.

6553 ACETYLCHOLINE-INDUCED TRANSPORT OF Na^+ AND K^+ IN THE PERFUSED CAT SUBMANDIBULAR GLAND. *(E.)* Poulsen, J. H. (Inst. Med. Physiol., Univ. Copenhagen, Denmark). *Pflugers Arch.* 349(3):215-220, 1974.

6554 EFFECT OF CAFFEINE ON INTESTINAL ABSORPTION OF ERGOTAMINE IN MAN. *(E.)* Schmidt, R.; Fanchamps, A. (Biol., Med. Res. Div., Sandoz Ltd., Basel, Switzerland). *Eur. J. Clin. Pharmacol.* 7(3):213-216, 1974.

6555 DEVELOPMENT OF MALNUTRITION IN RATS. *(E.)* Philbrick, D. J.; Hill, D. C. (Dept. Nutr., Univ. Guelph, Ontario, Canada). *Am. J. Clin. Nutr.* 27(8):813-818, 1974.

6556 COUNTER-TRANSPORT OF AMINO-ACIDS AND SUGARS IN THE GUINEA-PIG INTESTINE. *(E.)* Robinson, J. W. L. (Cantonal Hosp., Lausanne, Switzerland) *Experientia* 30(6):683, 1974.

6557 THE EFFECTS OF CORTISONE ACETATE ON STOMACH EVACUATION AND THE ABSORPTION OF ^{125}I-LABELLED GLOBULINS IN YOUNG RATS. *(E.)* Morris, B.; Morris, R. (Dept. Zool., Univ. Nottingham, England). *J. Physiol. (Lond.)* 240(1):79-89, 1974.

6558 SODIUM-INDEPENDENT ACTIVE TRANSPORT OF GLUCOSE FROM HAMSTER SMALL INTESTINE. *(E.)* Burdett, K.; Schneider, R. (Dept. Med. Biochem., Univ. Manchester, England). *Biochem. Soc. Trans.* 2(3):542-543, 1974.

6559 SODIUM TRANSPORT BY THE NEW-BORN PIG INTESTINE. *(E.)* de Jesus, C. H.; Smith, M. W. (Agr. Res. Council Inst. Anim. Physiol., Cambridge, England). *J. Physiol. (Lond.)* 240(2):38P-39P, 1974.

6560 SODIUM TRANSPORT ACROSS ISOLATED HUMAN JEJUNUM. *(E.)* Binder, H. J. (Yale Univ. Sch. Med., New Haven, Conn.). *Gastroenterology* 67(2):231-236, 1974.

6561 EVALUATION OF THE "FILTRATION THEORY" RELATIVE TO THE INTESTINAL SECRETION ASSOCIATED WITH CHOLERA TOXIN. *(E.)* Taylor, A. E.; Mortillaro, M. A. (Univ. Mississippi Sch. Med., Jackson). *Physiologist* 17(3):343, 1974.

6562 EFFECTS OF ANGIOTENSIN ON FLUID TRANSPORT BY RAT JEJUNUM IN VIVO. *(E.)* Bolton, J. E.; Munday, K. A.; Parsons, B. J.; Poat, J. A. (Dept. Physiol., Biochem., Univ. Southampton, England). *J. Physiol. (Lond.)* 241(1):33P-34P, 1974.

6563 EFFECT OF LUMINAL HYPERTONIC SOLUTIONS ON WATER ABSORPTION AND ULTRASTRUCTURE OF RABBIT GALL-BLADDER. *(E.)* Erlij, D.; Martinez-Palomo, A.; Valdes, M. (Dept. Physiol., Cell Biol., Invest. Ctr. I.P.N., Mexico City, Mexico). *J. Physiol. (Lond.)* 241(1):37P-39P, 1974.

6564 THE EFFECT OF CHRONIC HEAT STRESS ON INTESTINAL FUNCTION IN THE RAT. *(E.)* Carpenter, M.; Musacchia, X. J. (Dalton Res. Ctr., Univ. Missouri, Columbia). *Physiologist* 17(3):371, 1974.

6565 CHANGES IN INTESTINAL CARBOHYDRATE ABSORPTION AFTER EXPOSURE OF SWINE TO DIFFERENT DOSES OF RADIATION AND AFTER ABDOMINAL IRRADIATION OF TUMOR PATIENTS. *(Ger.)* Neumeister, K.; Koch, F.; Panndorf, H.; Johannsen, U.; Mehlhorn, G.; Oelssner, W. (Dept. Med., Karl Marx Univ., Leipzig, Germany). *Wissenschaftl. Z. Karl Marx Univ.* [*Math. Naturwissenschaftl. Reihe*] 23(1):48-52, 1974.

6566 EFFECT OF RADIOPROTECTIVE AGENTS ON TRANSPORT AND ULTRASTRUCTURE OF THE INTESTINAL WALL. *(Ger.)* Dienstbier, Z.; Hlavaty, V. (Inst. Biophysics Nuclear Med., Charles Univ., Prague, Czechoslovakia). *Wissenschaftl. Z. Karl Marx Univ.* [*Math. Naturwissenschaftl. Reihe*] 23(1):42-44, 1974.

6567 EFFECT OF CHEMICAL RADIOPROTECTIVE AGENTS ON RADIOSTRONTIUM RETENTION IN IRRADIATED RATS. *(Ger.)* Varga, L.; Mate, L.; Feher, I. (Frederic Joliot-Curie State Res. Inst. Radiation Biol. Radiation Hyg., Budapest, Hungary). *Wissenschaftl. Z. Karl Marx Univ.* [*Math. Naturwissenschaftl. Reihe*] 23(1):57-60, 1974.

6568 INTESTINAL CALCIUM ABSORPTION AND DISTURBANCES IN IT. I. PHYSIOLOGY OF INTESTINAL CALCIUM ABSORPTION. *(Ger.)* Ewe, K. (1st Med. Clin. Polyclin., Johannes Gutenberg Univ., Mainz, Germany). *Klin. Wochenschr.* 52(2):57-63, 1974.

6569 EFFECT OF DIET ON CARBOHYDRATE AND FAT METABOLISM. *(Ger.)* Verlohren, H. J.; Lohmann, D.; Bruckner, U.; Pohl, A.; Bemm, H. (Friesenstrasse Munic. Hosp., Leipzig, Germany). *Dtsch. Z. Verdauung. Stoffwechselkr.* 33(2):89-95, 1973.

6570 THE CHARACTERISTICS OF DIGESTIVE PROCESSES AND LIPID AND MINERAL METABOLISM IN CHILDREN 3 YEARS OLD OR YOUNGER FED QUALITATIVELY DIFFERENT DIETS. *(Rus.)* Kisliakovskaia, V. G.; Khar'kova, R. M.; Vasil'eva, L. P.; Gurevich, D. B.; Vasilevskaia, G. D.; Lesina, G. I.; Bogomolova, I. B. (Moscow Sci. Res. Inst. Pediatr. Pediatr. Surg., USSR). *Pediatriia* (11):10-14, 1973.

See also, 6583, 6637, 6642, 6758, 7273, 7286.

MOTILITY

6571 NATURE AND KINETICS OF INHIBITION OF LOWER ESOPHAGEAL SPHINCTER PRESSURE BY GLUCAGON. *(E.)* Jaffer, S. S.; Makhlouf, G. M.; Schorr, B. A.; Zfass, A. M. (Med. Coll. Virginia, Richmond). *Gastroenterology* 67(1):42-46, 1974.

The lower esophageal sphincter response to prompt i.v. injection of pentagastrin (0.25-1 µg/kg) alone or in combination with i.m. glucagon (10 µg/kg) was investigated in 4 healthy men. After pentagastrin injection, lower esophageal sphincter pressure rose rapidly to a peak in 1.5 min and returned to control levels in 4-5 min. The increase in pressure was dose-dependent, with 0.75 µg/kg pentagastrin eliciting the maximal response of 305% of resting pressure. Kinetic analysis of data indicated that the maximal response was approximately equal to that for gastrin, which suggests that the action of both peptides is mediated by the release of acetylcholine from nerve terminals. The decline in pressure at the highest pentagastrin dose was qualitatively similar to that reported for gastrin I. Glucagon significantly inhibited resting and pentagastrin-stimulated lower esophageal sphincter pressure. Resting pressure decreased 46% within 10 min of glucagon injection but by 20 min the pressure had recovered to 78% of control resting levels. Kinetic analysis showed that inhibition by glucagon was of the mixed type with a change both in affinity for and efficacy of pentagastrin. Endogenous glucagon released by i.v. infusion of alanine (0.15 g/kg in 4 min) had no effect on the resting pressure. Like secretin, glucagon apparently does not have a role in regulating the competence of the sphincter in the resting state. Its influence on the gastrin-stimulated sphincter during digestion remains to be determined.

6572 THE EFFECTS OF ELECTRICAL FIELD STIMULATION ON THE CIRCULAR MUSCLE OF THE HUMAN COLON IN VITRO.

(E.) Gunn, A. (Dept. Pharmacol., Manchester Univ., England). *Arch. Int. Pharmacodyn.* 208(2):14-18, 1974.

The effect of electrical field stimulation on the circular muscle of the human colon was studied *in vitro*. Healthy areas of distal colon removed from specimens resected for carcinoma were used in the study. No specimen was stored for a period exceeding 8 hr. The effects of antagonists on the response to acetylcholine (2.5×10^{-6} g/ml) were noted. Antagonists included atropine sulfate (10^{-7} g/ml), physostigmine sulfate (4.1×10^{-7} g/ml), hexamethonium bromide (10^{-4} g/ml), and tetrodotoxin (10^{-7} g/ml). Acetylcholine caused all specimens to contract. This response was stimulated by physostigmine and inhibited by atropine, but unaffected by tetrodotoxin or hexamethonium. The response to field stimulation was not significantly changed after the addition of hexamethonium, but was increased by physostigmine and reduced by both atropine and tetrodotoxin. An inhibitory response to field stimulation did not develop in the presence of atropine.

6573 THE EFFECTS OF METHYL METHACRYLATE VAPOR ON GASTRIC MOTOR FUNCTION.

(E.) Tansy, M. F.; Benhayem, S.; Probst, S.; Jordan, J. S. (Temple Univ. Sch. Dent., Philadelphia, Pa.). *J. Am. Dent. Assoc.* 89(2):372-376, 1974.

The effect of methyl methacrylate vapor on gastric motor activity was studied in 36 anesthetized male Sprague-Dawley rats prepared with tracheostomy tubes. A balloon and its attached tube, inserted in the stomach p.o., were filled with 3-5 ml water and were hydraulically coupled to a pressure transducer. Pressure changes produced by gastric motor activity were recorded on a strip chart recorder as functions of time. Exposure to 93.6 mg/liter/min methyl methacrylate vapor for 15 min sharply reduced both the amplitude and frequency of gastric pressure activity. This depression began within minutes of exposure and was maintained continuously during the exposure. Within 2 min after cessation of methyl methacrylate exposure, both the baseline and peak pressures returned to pre-exposure levels. Exposure to lower concentrations of vapor (1 mg/liter/min for 1 hr) produced similar but less pronounced effects; the most noticeable effect was a reduction in amplitude of the gastric pressure events which lasted for up to 20 min after cessation of exposure. Below 1 mg/liter/min, the effects of methyl methacrylate were not consistent. In a human subject, an open-tip catheter inserted in the gastric antrum enabled gastric pressure activity to be recorded upon inhalation of an uncontrolled concentration of methyl methacrylate from an open container filled with 20 ml of the liquid. A gradual decline in amplitude and frequency of intragastric pressure activity was apparent almost immediately, and the reductions became more pronounced as exposure time increased. When the vapor source was removed, activity began to increase slightly. Since a sublethal exposure to methyl methylacrylate vapor produces significant gastric motor effects in the rat, it would be prudent to determine the concentration *versus* time exposures that may constitute a hazard for occupationally exposed workers.

6574 ELECTRICAL AND MECHANICAL ACTIVITY OF CANINE STOMACH AFTER PRESERVATION.

(E.) Cook, M. A.; Kolodej, A.; Kowalewski, K. (Surg. Med. Res. Inst., Univ. Alberta, Edmonton, Canada). *Surg. Gynecol. Obstet.* 139(2):225-230, 1974.

The electrical and mechanical activity of an isolate whole canine stomach following prolonged preservatio and hypothermia and hyperbaria were measured to determine the effects of such storage on the motor activity of the stomach. The dissected stomachs were perfused rapidly through the vascular system and through the gastric lumen with 4 C Tyrode's solution They were stored immediately in a special chamber at 3 atmospheres of oxygen and 4 C. After storage periods of varying lengths, the stomachs were transferred to the perfusion chamber and connected with the perfusing blood circuitry. Measurements of electrical activity began almost at once. Except during an initial warm-up period, when a slower frequency was noted, the frequency of control waves recorded from preserved stomachs was the same as that from control stomachs, as long as the period of storage did not exceed 48 hr. The electrical and mechanical responses of these stomachs to injected pentagastrin, methacholine, and 1,1-dimethyl-4-phenylpiperazinium and to vagal stimulation suggested normal functioning of the musculature and intramural plexus layers. Stomachs preserved beyond 48 hr were in poorer conditio and little useful information could be obtained from them. This technique may prove useful for assessing a preserved organ and thereby aid in transplantation operations. It may also be useful in the study of normal motility of the stomach.

6575 INTRALUMINAL ESOPHAGEAL MANOMETRY: AN ANALYSIS OF VARIABLES AFFECTING RECORDING FIDELITY OF PERISTALTIC PRESSURES.

(E.) Stef, J. J.; Dodds, W. J.; Hogan, W. J.; Linehan, J. H.; Stewart, E. T. (Milwaukee Cty. Gen. Hosp., Wis.). *Gastroenterology* 67(2):221-230, 1974.

Bench studies, esophageal specimens (autopsy specimens suspended in fluid-filled chambers), and manometric studies in man were used to evaluate the performance characteristics of the 2 systems currently used for recording esophageal pressure: the infused-catheter system and an intraluminal transducer system. Variables studied were internal diameter of catheter, catheter length, infusion rate, amplitude, and duration of pressure complex, and also the pump system. The major cause of recording error by infusion manometry was delivery of less fluid than the setting required, sometimes as little as 15% of the rated setting. Recording accuracy was inversely related to amplitude and directly related to infusion rate and duration. For infusion manometry, pressure amplitude was recorded accurately at an infusion rate of 1.6 or 3.1 ml/min in the thoracic esophagus and 6.1 ml/min in the cervical esophagus. In the atter, peristaltic complexes were higher in ampliude (165 mm Hg) and shorter in duration (2.6 sec) han in the thoracic esophagus. The intraluminal ransducers recorded pressure accurately under all onditions tested.

576 CONTRACTILE RESPONSES AND ^{45}Ca MOVEMENTS IN MONKEY ILEAL SMOOTH MUSCLE. *(E.)* oodman, F. R.; Weiss, G. B. (Univ. Texas, Southwest. ed. Sch., Dallas). *Arch. Int. Pharmacodyn. Ther.* 09(1):14-25, 1974.

577 ELECTROPHYSIOLOGICAL DATA ON THE PART OF THE GASTROINTESTINAL TRACT ABOUT SPASMOYTIC EFFECT OF A PIPERAZINE DERIVATIVE UNDER THE ODE OF 4P-79. *(E.)* Ivanova, N. S.; Papasova, M. . (Chem. Pharm. Res. Inst., Sofia, Bulgaria). *okl. Bulg. Akad. Nauk* 27(6):867-870, 1974.

578 EFFECTS OF VARYING DEGREES OF VAGOTOMY ON THE GASTRODUODENAL RESPONSE TO FOOD. *(E.)* toddard, C. J.; Duthie, H. L. (Roy. Infirm., Sheffield, England). *Gut* 15(4):348, 1974.

579 NALOXONE-INDUCED FACILITATION OF CONTRACTIONS, SPONTANEOUS ACTIVITY AND TOLERANCE O MORPHINE IN ILEUM OF MORPHINE-DEPENDENT GUINEAIGS. *(E.)* Van Neuten, J. M.; Lal, H. (Janssen harm., Beerse, Belgium). *Arch. Int. Pharmacodyn. her.* 208(2):378-382, 1974.

580 TECHNIQUE FOR INVESTIGATING INTESTINAL MOTILITY IN NONANESTHETIZED ANIMALS. *(It.)* ranata, L.; Leone, D.; Paccione, F.; Rucci, E. (Inst. um. Physiol., Univ. Bari, Italy). *Boll. Soc. Ital. iol.-Sper.* 49(13):832-835, 1973.

6581 EFFECTS OF EMOTIONAL STIMULI ON JEJUNAL MOTILITY. *(It.)* Granata, L.; Leone, D.; Paccione, F.; Ruccia, D. (Inst. Hum. Physiol., Univ. Bari, Italy). *Boll. Soc. Ital. Biol. Sper.* 49(13): 836-840, 1973.

6582 SOME PATHOPHYSIOLOGICAL STUDIES OF THE GASTROINTESTINAL TRACT IN SWINE AFTER EXPOSURE TO DIFFERENT DOSES OF RADIATION. *(Ger.)* Neumeister, K.; Panndorf, H.; Koch, F.; Mehlhorn, G.; Johannsen, U. (Dept. Med., Karl Marx Univ. Leipzig, Germany). *Wissenschaftl. Z. Karl Marx Univ.* [*Math. Naturwissenschaftl. Reihe*] 23(1):15-19, 1974.

6583 SOME NOTES ON CHANGES IN GASTROINTESTINAL MOTILITY, SECRETION, AND ABSORPTION IN IRRADIATED RATS. *(Ger.)* Grossmann, V.; Chmelar, V.; Kvetina, J. (Med. Fac., Charles Univ., Hradec Kralove, Czechoslovakia). *Wissenschaftl. Z. Karl Marx Univ.* [*Math. Naturwissenschaftl. Reihe*] 23(1):33-37, 1974.

6584 FUNCTIONAL DISORDERS OF THE STOMACH IN IRRADIATED RATS. *(Ger.)* Visnovsky, P.; Grossmann, V. (Inst. Pharmacol., Comenius Univ., Martin, Czechoslovakia). *Wissenschaftl. Z. Karl Marx Univ.* [*Math. Naturwissenschaftl. Reihe*] 23(1):38-41, 1974.

6585 PASSAGE OF ^{88}Y THROUGH THE GASTROINTESTINAL TRACT IN IRRADIATED RATS. *(Ger.)* Vondracek, V.; Hradil, J. (Purkynje Med. Res. Inst., Hradec Kralove, Czechoslovakia). *Wissenschaftl. Z. Karl Marx Univ.* [*Math. Naturwissenschaftl. Reihe*] 23(1): 53-56, 1974.

6586 LUMINAL PRESSURE IN THE INTESTINE AND FACTORS DETERMINING ITS MAGNITUDE. *(Rus.)* Gal'perin, Iu. M.; Popova, T. S. (N. V. Sklifosovskii Sci. Res. Inst. Emergency Med., Moscow, USSR). *Biull. Eksp. Biol. Med.* 77(5):10-13, 1974.

See also, 6519, 6550, 6557, 6567, 6625, 6628, 6752, 6820, 6981.

SECRETION AND METABOLISM

6587 THE METABOLISM OF ^{14}C-LABELLED ESSENTIAL AMINO ACIDS GIVEN BY INTRAGASTRIC OR INTRAVENOUS INFUSION TO RATS ON NORMAL AND PROTEIN-FREE DIETS. *(E.)* Neale, R. J.; Waterlow, J. C. (London Sch. Hyg. Trop. Med., England). *Br. J. Nutr.* 32(1):11-25, 1974.

A group of rats were fed either normal or protein-free diets for 20 days. After an overnight fast, leucine, valine, lysine, and phenylalanine, all uniformly labeled with ^{14}C, were given by intragastric or i.v. infusion for 4 hr. Expired carbon dioxide was collected during infusion. Radioactivity measurements in the liver, muscle, skin, gastrointestinal tract, and the remaining carcass after infusion was complete showed no significant differences between results obtained with different amino acids. In comparing the two routes of administration, no significant difference was noted in the output of $^{14}CO_2$ expressed as a proportion of the administered radioactivity. Slightly greater radioactivity was recovered in liver and gastrointestinal tract, and less in the skin, when using intragastric infusion. A comparison of the two diets showed no difference in the proportion of dose oxidized to carbon dioxide. In rats on the protein-free diet, significantly more of the dose was recovered in the liver and gastrointestinal tract, and less in the skin. Rats receiving the protein-free diet excreted more CO_2/kg with a lower specific radioactivity. Thus, no indication of adaptive changes in the oxidation of essential amino acids was noted. However, the results are not conclusive, for under these experimental conditions the output of $^{14}CO_2$ is not a valid measure of the extent of amino acid oxidation.

6588 EFFECT OF INTRAGASTRIC ADMINISTRATION OF ALCOHOL ON THE ETHANOL CONCENTRATION AND OSMOLALITY OF PANCREATIC JUICE, BILE, AND PORTAL AND PERIPHERAL BLOOD. *(E.)* Beck, I. T.; Paloschi, G. B.; Dinda; P. K., Beck, M. (Hotel Dieu, Kingston, Canada). *Gastroenterology* 67(3):484-489, 1974.

The concentration of ethanol and the osmotic changes of biliary and pancreatic secretions in relation to those of the portal and general circulation were studied by introducing ethanol into the stomach of male dogs. Of the total dose of ethanol (0.86 ml/kg absolute ethanol as a 25% (v/v) solution), 2/3 was given as a priming dose p.o. through stomach tube. The remainder was infused at a constant rate. Pancreatic secretion was stimulated by a constant i.v. infusion of secretin (0.27 U/kg/min). The mean steady-state concentration of ethanol in the portal blood was significantly higher than in the peripheral blood and the concentration of ethanol in bile was significantly higher than in pancreatic secretion or in arterial blood, but significantly lower than in the portal blood. The data indicate that alcohol ingestion causes elevated plasma osmolality. The increase in osmolality represents the molar concentration of ethanol in portal serum, peripheral serum, biliary, or pancreatic secretion. A 51-yr-old patient with pancreatocutaneous fistula was given ethanol (125 ml of a 25% (v/v) solution), and pancreatic secretions were collected from the fistula. The ethanol concentration of the secretions and peripheral blood was similar. The osmolality of the pancreatic secretions and peripheral blood increased. These findings suggest that the pancreas secretes ethanol iso-osmotically and does not metabolize alcohol appreciably. Since ethanol penetrates the wall of the gastrointestinal tract rapidly, the liver would carry the highest concentration of ethanol, and there would be considerable enterohepatic circulation of alcohol.

6589 INHIBITION OF HEIDENHAIN POUCH PEPSIN SECRETION BY COMMERCIAL CHOLECYSTOKININ AND DUODENAL FAT IN DOGS. *(E.)* Nakajima, S.; Magee, D. F. (Creighton Univ. Sch. Med., Omaha, Neb.). *Ann. Surg.* 180(2):243-246, 1974.

In 5 unanesthetized dogs with Heidenhain pouches and separated duodenal pouches, i.v. infusion of cholecystokinin (1.0 Ivy dog U/min) produced 80.5% and 88.4% mean depression, resp., of acid and pepsin secretion stimulated by pentagastrin (1.0 μg/min i.v.). Acid response to methacholine (2.0 μg/min i.v.) was temporarily increased during cholecystokinin infusion, but the increase was not significant. Methacholine-stimulated pepsin secretion was depressed 76.5% by cholecystokinin. Similar secretory patterns were observed when duodenal pouches were irrigated with emulsified fat after pentagastrin or methacholine administration. In pentagastrin-stimulated animals, the emulsified fat irrigation caused a 32.8% mean depression of acid secretion an a 74.9% inhibition of pepsin. Acid secretion stimulated by methacholine was temporarily increased by 78.4% and pepsin secretion was inhibited by 69.3%. The results indicate that fat releases endogenous cholecystokinin from the duodenal mucosa and that cholecystokinin or duodenal fat is a potent inhibitor of gastric pepsin secretion from Heidenhain pouches.

6590 MUCOSAL DNA SYNTHESIS: A SHORT TERM INDE OF THE TROPHIC ACTION OF GASTRIN. *(E.)* Johnson, L. R.; Guthrie, P. D. (Univ. Texas Med. Sc Houston). *Gastroenterology* 67(3):453-459, 1974.

The effect of a single injection of pentagastrin (250 μg/kg) on incorporation of ^{3}H-thymidine into DNA of gastrointestinal tissues was investigated in male Sprague-Dawley rats. Animals were killed 4-24 hr after injection, and small pieces of stomach, duodenum, ileum, and liver were removed and incubat for 30 min in a medium containing 2 μC/ml ^{3}H-thymid DNA was extracted and the rate of DNA synthesis was determined by scintillation counting. Pentagastrin had no effect on DNA synthesis in the liver. In all other tissues studied, maximal stimulation occurred 16 hr after pentagastrin injection. At 16 hr, incorporation of thymidine in experimental animals was 275% of control for the stomach, 300% for the duodenum, and 480% for the ileum. Results of a single experiment with 3 different doses of pentagastrin (125, 250, and 500 μg/kg) showed that 250 μg/kg was the optimal dose for stimulation of DNA synthesis. In another series of studies, histamine (20 mg/kg) had no effect on DNA synthesis, indicating that the trophic effects of gastrin are independent of acid secretion. While trophic actions of pentagastrin on other gastrointestinal tissues have been describ previously, this is the 1st report of a trophic eff of gastrin on the ileum.

6591 MEMBRANE EFFECTS MEDIATED BY ALPHA- AND BETA-ADRENOCEPTORS IN MOUSE PAROTID ACINA CELLS. *(E.)* Petersen, O. H.; Pedersen, G. L. (Inst. Med. Physiol. C, Univ. Copenhagen, Denmark). *J. Membr. Biol.* 16(4):353-362, 1974.

6592 DIFFERENT TEMPERATURE DEPENDENCE OF LUMINAL AND CONTRALUMINAL ION TRANSPORT IN THE CAT SUBMANDIBULAR GLAND. *(E.)* Laugesen, L. P.; Nielsen, J. O. D.; Poulsen, J. H. (Inst. Med. Physiol., Univ. Copenhagen, Denmark). *Acta Physiol. Scand.* 91(3):52A, 1974.

6593 BIOLOGICAL ACTIVITIES IN THE GRANULES ISOLATED FROM THE MOUSE SUBMAXILLARY GLAND. *(E.)* Pasquini, F.; Petris, A.; Sbaraglia, G.; Scopelliti, R.; Cenci, G.; Frati, L. (Inst. Histol., Embryol., Gen. Path., Univ. Perguia, Italy). *Exp. Cell Res.* 86(2):233-236, 1974.

94 EVIDENCE FOR EXTRANORADRENERGIC DOPAMINE-β-HYDROXYLASE ACTIVITY IN RAT SALIVARY AND. *(E.)* Coyle, J. T.; Wooten, G. F.; Axelrod, (Natl. Inst. Mental Health, Bethesda, Md.). *J. urochem.* 22(6):923-929, 1974.

95 RADIOIMMUNOASSAY OF INTESTINAL HORMONES. *(E.)* Bloom, S. R. (Middlesex Hosp. Med. h., London, England). *Gut* 15(6):502-510, 1974.

96 ESTIMATION OF THE FILTRATION CONSTANT OF DOG SUBMAXILLARY GLAND EPITHELIA. AN PROXIMATE VALUE OF HYDRAULIC CONDUCTIVITY. *(E.)* ai, Y.; Morimoto, T.; Imamura, A. (Kyoto Pref. iv. Med., Japan). *Jap. J. Physiol.* 24(1):35- , 1974.

97 HISTOCHEMICAL STUDIES ON THE SALIVARY GLANDS IN WHITE RATS IN VITAMIN A DEF-IENCY. I. β-GLUCURONIDASE AND β-GALACTOSIDASE SECRETORY CELLS OF THE SUBLINGUAL AND SUBMAND-ULAR GLANDS. *(E.)* Kostulak, A. (Med. Acad., ansk, Poland). *Folia Morphol. (Warsz.)* 33(1): -35, 1974.

98 EFFECT OF INTAKE OF EXCESS ALCOHOL ON THE METABOLISM OF GLUCOSE IN RAT. *(E.)* makrishnan, S. (Jawaharlal Inst. Postgrad. Med. uc. Res., Pondicherry, India). *Indian J. Bio-em. Biophys.* 10(4):276-278, 1973.

6599 BIOCHEMICAL EFFECTS OF AFLATOXINS. *(E.)* Wogan, G. N. (Dept. Nutr. Food Sci., Massachusetts Inst. Technol., Cambridge). *Isr. J. Med. Sci.* 10(4):441-445, 1974.

6600 ULTRASTRUCTURAL BASIS OF DRUG METABOLISM. *(E.)* Jezequel, A. M. (Gen. Hosp., Ancona, Italy). *Isr. J. Med. Sci.* 10(4):380-385, 1974.

6601 RADIOIMMUNOASSAY MEASUREMENT OF THE DISAPPEARANCE HALF-TIME OF EXOGENOUS CHOLECYSTOKININ. *(E.)* Reeder, D. D.; Villar, H. V.; Brandt, Jr., E. N.; Rayford, P. L.; Thompson, J. C. (Univ. Texas Med. Branch, Galveston). *Physiologist* 17(3):319, 1974.

6602 EFFECT OF SODIUM GLUTAMATE ADMINISTRATION ON THE METABOLISM DURING INTENSE EXERCISE. *(Cz.)* Brodan, V.; Kuhn, E.; Pechar, J.; Plácer, Z.; Slabochova, Z. (Res. Ctr. Metab. Dig., Prague, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 28(2):127-135, 1974.

See also, 6569, 6857.

SECRETION AND METABOLISM

Stomach

03 A STUDY OF THE EFFECT OF BETAHISTINE ON GASTRIC ACID SECRETION IN MAN. *(E.)* ochran, K. M.; Allan, J. G.; Russell, R. I. (Glas-w Roy. Infirm., Scotland). *Curr. Med. Res. Opin.* 2):63-66, 1974.

istric acid secretion in 6 healthy volunteers (4 en and 2 women, aged 22-39 yr) was measured follow-g i.v. administration of betahistine, a histamine-ike drug with some histamine effects. Betahistine 1 5% dextrose solution was infused 0.5 mg/min for) min, and then 1.0 mg/min for the next 60 min; in ie subject infusion of 2.0 mg/min for 60 min was ven. These dosages were in excess of the thera-utic p.o. range of 24-48 mg/day. Gastric secre-ons, collected for each 60 min period throughout ie infusion, showed total acidity values of 3.58, 65, and 6.51 mEq, resp., for the 3 infusion rates, mpared to 3.34 mEq for the mean basal collection. ie standard 60-min acid secretion test using penta-istrin (6 μg/kg, i.m.) gave a mean of 14.99 mEq. ide effects with betahistine were headache and ushing in 5 of the 6 subjects. These results sug-est that betahistine does not increase gastric acid ecretion in normal subjects. It is concluded that icrease in acid secretion is not a factor in the production of the occasional dyspepsia reported in patients treated with betahistine for Meniere's syndrome and cerebral atherosclerosis.

6604 DUODENAL ACIDIFICATION: ROLE OF FIRST PART OF DUODENUM IN GASTRIC EMPTYING AND SECRETION IN DOGS. *(E.)* Cooke, A. R. (VA Hosp., Iowa City). *Gastroenterology* 67(1):85-92, 1974.

Gastric emptying and gastric acid secretion in response to duodenal acidification were studied in dogs with gastric and duodenal fistulas. The duodenal fistulas were placed about 5 cm distal to the pylorus. Three series of emptying studies were performed in 5 dogs. In one series, gastric emptying of a saline meal (300 ml) was studied in response to perfusion of the second part of the duodenum and distally with 0-12 mEq/hr of HCl at a constant rate of 100 ml/hr. In the second series, only the proximal 5 cm of the duodenum was acidified, and this was accomplished by diverting an acid test meal (300 ml of 40-120 mEq/liter of HCl) at the duodenal fistula. In the third series of tests, the acid meals were combined with acid perfusion so that the whole duodenum and proximal jejunum were acidified. Controls consisted of saline test meals (300 ml) and saline perfusion of the duodenum. Gastric emptying with acid in the first part of the duodenum was delayed, and the delay was about equal to perfusion of the rest of the duodenum. Acidification of the whole duodenum caused greatest delay in emptying, and the maximal effect was in response to 12 mEq/hr. Delay in gastric emptying with acid in the proximal 5 cm of the duodenum was rapid and sensitive, and occurred within 1 min and in response to 0.24-0.36 mEq of HCl. The effect of allowing acid, stimulated by histamine and pentagastrin, to bathe the first part of the duodenum was studied in 3 dogs. This was done by closing the gastric fistula and collecting from the duodenal fistula. Acidification of the first part of the duodenum inhibited (40%) pentagastrin, but not histamine-stimulated acid secretion. These studies indicate that the proximal 5 cm of duodenum is not only important for inhibition of acid secretion, but is also a powerful and sensitive site for inhibition of gastric emptying.

6605 ANTRAL AND DUODENAL ACIDIFICATION: EFFECT ON PENTAGASTRIN-STIMULATED ACID SECRETION IN THE DOG. *(E.)* Wheeler, M. H.; Prescott, R. J.; Forrest, A. P. (Dept. Clin. Surg. Univ. Edinburgh, Scotland). *Am. J. Surg.* 128(3):331-335, 1974.

For simultaneous assessment of the effect of antral acidification on pentagastrin-stimulated acid secretion by both innervated and denervated gastric mucosa, 3 dogs were each prepared with a vagally denervated fundic pouch, a vagally innervated antral pouch, and a gastric fistula. Acid secretory responses to constant i.v. infusion of pentagastrin (1.5 μg/kg/hr) were measured during antral pouch perfusion (1 ml/min) with isotonic saline at pH 7.0 for 2 hr followed by perfusion at pH 1.0 for 2 hr or *vice versa*. Gastric acid was collected from the fundic pouch with the fistula closed, from the fundic pouch with the fistula open, and from the gastric fistula. Administration of perfusate gave the same results regardless of the order in which solutions were perfused. Antral acidification at pH 1.0 did not inhibit the acid secretory response of the fundic pouch when the gastric fistula was closed, nor did it affect the acid secretion of the denervated fundic pouch or innervated main stomach when the gastric fistula was open. Diversion of acid from the duodenum had no influence on the overall level of acid secretion from the fundic pouch. Antral acidification significantly inhibited the acid output of the fundic pouch after ingestion of a meat meal (25 g/kg). Such inhibition resulted from diminished vagal gastrin release after a decrease in antral pH. Since antral acidification did not suppress pepsin secretory response to a meat meal, vagal gastrin is not an important factor in the stimulation of pepsin secretion. These results do not support the existence of an antral inhibitory hormone or inhibitory neural reflex active against pentagastrin-stimulated gastric secretion in the dog. Antral inhibition of gastric secretion is the result of diminished release or formation of endogenous gastrin.

6606 QUANTITATIVE CYTOCHEMICAL ESTIMATION OF THE EFFECT OF PENTAGASTRIN (0.005-5 pg/ml) AND OF PLASMA GASTRIN ON THE GUINEA PIG FUNDUS IN VITRO. *(E.)* Loveridge, N.; Bloom, S. R.; Welbourn, R. B.; Chayen, J. (Middlesex Hosp. Med. Sch., London, England). *Clin. Endocrinol. (New York)* 3(3):389-396, 1974.

Use of a new cytochemical approach to the bioassay of gastrin was undertaken *in vitro* on strips of fundic stomach from female guinea pigs (Hartley strain) by assessment of carbonic anhydrase activity. Exposure of tissue strips to graded concentrations of pentagastrin (0.005-5 pg/ml) at pH 7.0 produced a positive linear correlation between parietal cell activity (integrated extinction X 100) and pentagastrin concentration (log to base 10) on a calibration graph. By use of this graph, gastrin activity in diluted human plasma (1:100 and 1:1000) was extrapolated from parietal cell activity results obtained when tissue strips were exposed to the 2 plasma dilutions. The addition of 10^{-5} acetazolamide, a carbonic anhydrase inhibitor, to the reaction medium almost completely inhibited the graded response of parietal cells to increasing concentrations of pentagastrin. Maximum enhancement of carbonic anhydrase activity was found in tissues exposed for 5 min at pH 7.0. Plasma gastrin activity obtained by extrapolation was verified by separate measurements on 4 aliquots from each sample, with resulting standard deviations of less than ±0.7 for each sample. A comparative study on 5 plasma samples showed that radioimmunoassay and the cytochemical assay gave comparable results. The cytochemical assay allows measurement of pentagastrin to a level of 0.005 pg/ml (6.6 X 10^{-15} M), and gastrin-like activity in human plasma at concentrations equivalent to or less than 0.05 pg/ml (2.3 X 10^{-14} M) of human gastrin (synthetic 17 amino acid gastrin).

6607 EFFECT OF HISTAMINE H-RECEPTOR BLOCKADE ON FASTING SERUM GASTRIN AND FASTING GASTRIC ACID SECRETION IN THE DOG. *(E.)* Barbezat, G. O.; Daniel, M.; Bank, S.; Grant, B.; Vinik, A. (Groote Schuur Hosp., Cape Town, South Africa). *Nature (Lond.)* 249(5458):666-668, 1974.

To investigate the effects of burimamide, an antagonist of histamine H_2-receptors, on gastric acid secretion and blood gastrin levels under basal conditions, 2 mongrel dogs with gastric fistulas and 2 control dogs were studied 3 months after surgery. All animals were fasted for 16 hr before each experimental procedure. Burimamide injection (8 mg/kg i.v.) resulted in minimal variations in serum gastrin concentrations with no significant differences from basal levels of 40-80 pg/ml. After a small decrease, gastric acid secretion increased slightly 30-60 min after burimamide, but this was small in terms of acid output, reaching a maximum of 1.20 and 0.72 mEq/15 min over basal levels in the 2 dogs. The results in this study show that serum gastrin levels are not altered by i.v. burimamide given to fasting dogs. There is no evidence to support the concept that H_2-receptor antagonists inhibit gastric acid secretion by acting outside the parietal cell. However, it is possible that histamine and gastrin ct on different receptors on the same cell. Since urimamide has a short duration of action in both ogs and pigs, the late rise in gastric acid secreion following burimamide may result from rebound ollowing withdrawal of the inhibitor. This reound phenomenon can be clinically relevant if it ccurs when H_2-receptor antagonists are used theraeutically in man.

608 THE EFFECT OF BETA-ANDRENERGIC BLOCKADE UPON GASTRIC ACID SECRETION AND GASTRIN ECRETION DURING HYPOGLYCAEMIA BEFORE AND AFTER VAOTOMY.

(E.) Kronborg, O.; Pedersen, T.; Stadil, .; Rehfeld, J. F. (Bispebjerg Hosp., Copenhagen, enmark). *Scand. J. Gastroenterol.* 9(2):173-176, 974.

he effect of propranolol on the gastric acid and erum gastrin responses to hypoglycemia were investiated in a double-blind trial involving 29 patients 10 with intact gastric vagal innervation, including with duodenal or prepyloric ulcers; 9 with duodenal r prepyloric ulcers who had been subjected to vagoomy and drainage 10 days previously; and 10 with uodenal prepyloric ulcers who had been subjected to agotomy and drainage 2 to 3 months previously). All atients had two insulin tests separated by an interal of 1 or 2 days. Two hr prior to each test the ubjects were given a placebo or a tablet containing 0 mg of propranolol. Propranolol suppressed the seum gastrin concentrations in the fasting state and uring hypoglycemia in the ulcer patients both before nd after vagotomy. The fasting acidity was suppressd in the vagotomized patients and increased in the ntact patients; the insulin-activated acidity was educed in both groups. Depression of the gastrin evels by propranolol occurred 15 to 45 min before he depression of gastric acidity. The depression of erum gastrin levels by propranolol may be due to a eta-blockade of an adrenergic stimulation of the anrum.

609 EFFECT OF RESERPINE ON SERUM GASTRIN CONCENTRATION AND ON MUCOSAL AMINES AND AMINO CID DECARBOXYLASE ACTIVITIES IN RAT STOMACH.

(E.) akanson, R.; Liedberg, G.; Rehfeld, J. F.; Sundler, .; Ericson, L. E. (Dept. Pharmacol., Univ. Lund, Sween). *J. Pharmacol. Exp. Ther.* 189(3):603-615, 1974.

eserpine is known to reduce gastric mucosal 5-hydroxyryptamine and histamine and to stimulate acid secreion. The present study on 1400 male Wistar rats hows that this effect of reserpine (0.1-25 mg/kg) in he stomach of the rat is independent of an intact xtrinsic autonomic innervation, as seen in 160 vaotomized and 17 sympathectomized rats, and probably esults from a direct action on the amine storage echanisms. Reserpine failed to affect pyloric histiine decarboxylase but caused a short-lasting reducion in oxyntic histidine decarboxylase activity ollowed by a progressive rise in the enzyme activity ack to normal or even supra-normal values. This haracteristic pattern was observed in both vagotomzed and unoperated rats. The reduction of enzyme ctivity was interpreted as the result of enzyme leakage from the histamine-producing cells of the oxyntic mucosa or of specific inhibition of histidine decarboxylase synthesis. The increase in enzyme activity was prevented by antrectomy, performed on 45 rats, suggesting that the activation was a result of reserpine-induced gastrin release. This assumption was supported by the finding of an increase in serum gastrin concentrations coinciding in time with the enzyme activation and possibly of increased acid production.

6610 EFFECT OF INTRAVENOUSLY ADMINISTERED CALCIUM ON SERUM GASTRIN AND GASTRIC SECRETION IN MAN.

(E.) Reeder, D. D.; Becker, H. D.; Thompson, J. C. (Univ. of Texas Med. Branch, Galveston). *Surg. Gynecol. Obstet.* 138(6):847-851, 1974.

Serum gastrin responses to i.v. infusion of calcium were determined in 21 healthy volunteers, 12 patients with duodenal ulcers, and 5 patients who had undergone total gastrectomy and who had residual Zollinger-Ellison tumors. During a 1 hr basal period, normal saline solution was infused i.v. at the rate of 50 ml/hr. During the next 4½ hr, calcium gluconate (4 mg/kg) was infused at 50 ml/hr; in the patients with the Zollinger-Ellison syndrome, the calcium infusion lasted 4 hr. Additionally, an i.v. loading dose of calcium (4 mg/kg) was injected slowly during the first 30 min of calcium infusion. In normal subjects, calcium infusion doubled the mean basal acid output, whereas in patients with duodenal ulcer disease, the increase in gastric output was about 250%. Patients with a duodenal ulcer secreted more than 5 times as much acid as did normal persons. Serum gastrin concentrations rose 34% over basal in normal persons, 94% in those with a duodenal ulcer, and 55% in patients with Zollinger-Ellison tumors after total gastrectomy. The integrated gastrin output of the patients with a duodenal ulcer was more than double that of controls and less than ½ that of the patients with the Zollinger-Ellison syndrome. The mechanism by which hypercalcemia induces elevated serum gastrin levels is not clear. While calcium appears to serve as a coupling factor between excitation and secretion at many endocrine glands, it is not known if the gastrin releasing mechanism acts similarly.

6611 GASTRIC ACID RESPONSES TO ANTRAL APPLICATION OF SOME AMINO ACIDS, PEPTIDES, AND ISOLATED FRACTIONS OF A PROTEIN HYDROLYSATE.

(E.) Elwin, C. E. (Karolinska Inst., Stockholm, Sweden). *Scand. J. Gastroenterol.* 9(3):239-247, 1974.

The stimulatory effect of single amino acids and of some peptides when applied in the antrum has been studied. Mongrel dogs were provided with either Heidenhain or Pavlov pouches. Amino acids with 2 or 3 carbons (glycine, β-alanine) demonstrated secretagogue activity. This activity decreased with methylation of the amino group (sarcosine) or with a change in its steric location (α-alanine). Usually di- or tri-peptides derived from glycine and alanine were less active. Glycyl-glycine proved an exception to this generalization. An additive effect was noted when 2 amino acids were concomitantly introduced to the antral pouch. In no instance of combined administration was a synergistic effect demonstrated. Peptides of a protein hydrolysate were separated by dialysis, ultrafiltration, or gel filtration. The potency of the isolated fraction to stimulate gastric secretion was related to molecular size of the peptide and the presence of free amino acids. The smaller peptides and those having more free amino acid groups had the most pronounced effects. The stimulation of acid secretion by these compounds is most likely due to release of gastrin, since it has been shown that feeding increases serum gastrin levels.

6612 EFFECT OF GLUCAGON ON GASTRIC SECRETION IN FISTULA CHICKENS.

(E.) Burhol, P. G. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(4):411-414, 1974.

The effect of i.v. injection of glucagon (25, 50, and 100 μg/kg) on basal gastric secretion was studied in 8 unanesthetized chickens with gastric fistulas. Each dose was given once to each chicken on separate days. Gastric juice samples were collected for 90 min and analyzed in 15-min aliquots. Glucagon produced a significant and dose-dependent fall in the gastric secretion rate. Concomitantly, glucagon caused a significant and dose-dependent decline in the mean gastric H^+ output from a basal level of 0.27 to 0.04 mEq/15 min. The mean pepsin output dropped significantly from a basal level of 2.0 to 0.6 mg/15 min only with the highest dose of glucagon. The ratio of pepsin to H^+ rose significantly after glucagon administration, indicating that more pepsin is secreted/U of H^+ secretion after glucagon injection than before. The prompt gastric inhibition following glucagon administration suggests a direct action of glucagon on the gastric mucosa. It is not yet known if the recently discovered glucagon-like substances released from the gut of mammals and birds affect gastric secretion. If they do, it is possible that glucagon participates in the physiological regulation of gastric secretion.

6613 ACTIONS OF METIAMIDE, AN H_2-HISTAMINE RECEPTOR ANTAGONIST, ON GASTRIC H^+ AND PEPSIN SECRETION IN DOGS.

(E.) Gibson, R.; Hirschowitz, B. I.; Hutchison, G. (Dept. Med., Univ. Alabama, Birmingham). *Gastroenterology* 67(1):93-99, 1974.

Metiamide, a thiourea analog of histamine, is an antagonist of the gastric histamine receptor (type H_2). At i.v. doses of 0.2 and 0.5 mg/kg/hr, it was a potent competitive inhibitor of H^+ secreted by dogs in response to step-doses of histamine (5-100 μg/kg/hr), pentagastrin (0.1-10 μg/kg/hr), and bethanechol (20-120 μg/kg/hr). At a dose of 2.5 mg/kg/hr, metiamide almost completely inhibited histamine stimulation (acting uncompetitively), but had a less potent effect on pentagastrin and 2-deoxyglucose (100 mg/kg) stimulated H^+ secretion. By contrast, during metiamide administration, pepsin secretion stimulated by the cholinergic stimuli, bethanechol and 2-deoxyglucose, was further increased, while H^+ secretion was inhibited. All stimuli for both H^+ and pepsin exhibited dose-reversal effects. The mechanism of this inhibitory effect of even potent stimuli is not known. The fact that histamine in small doses does stimulate pepsin secretion suggests that the histamine receptor may be a site with a very low dose-reversal point. The H_2 receptor, on the parietal cell, has a high dose-reversal point. The dose-reversal point for bethanechol (i.e. above 80 μg/kg/hr) is well below the maximum secretory capacity of the gastric mucosa. Metiamide shifts this point to the right to the extent that the whole curve of the dose response is shifted, but does not alter the essential features of dose reversal, which is analogous to inhibition of enzyme reaction by an excess of substrate, rather than to feedback inhibition by a product of the enzyme action.

6614 COMPARISON OF VAGAL AND MEAT STIMULATION OF GASTRIC ACID SECRETION AND SERUM GASTRIN IN CATS.

(E.) Blair, E. L.; Grund, E. R.; Reed, J. D.; Shaw, B.; Wilkinson, J. (Dept. Physiol., Univ. Newcastle upon Tyne, England). *J. Physiol. (Lond.)* 240(2):33P-34P, 1974.

In chloralose-anesthetized cats with the stomach divided into antral and fundic pouches, the concentration and amount of serum gastrin, as well as the amount of gastric acid, secreted during vagal excitation were compared with values during stimulation by meat-extract instillation into the antral pouch. Acid secretion and gastric mucosal blood flow were measured by electrometric titration and amidopyrene clearance, resp., and serum gastrin by radioimmunoassay. In 4 animals vagal stimulation preceded meat-extract presentation while in 4 others the order was reversed. During vagal excitation, both the mean acid secretion (54 μEq/3 min) and mucosal blood flow (10.7 ml/3 min) were significantly greater than during meat stimulation (12.0 μEq/3 min and 3.2 ml, resp.). By contrast, the mean serum gastrin concentration was significantly less during vagal stimulation (35.0 pg/ml) than with meat extract (132.0 pg/ml). There was no significant difference in the mean total serum gastrin during the 2 types of stimulation. Present findings indicate vagal stimulation produces significantly greater acid secretion than can be attributed to the action of gastrin alone. Probably, action of the vagus on gastric acid secretion is not limited to its role in the release of gastrin.

6615 MECHANISM OF THEOPHYLLINE STIMULATION OF ACID SECRETION BY FROG GASTRIC MUCOSA.

(E.) High, W. L.; Hersey, S. J. (Dept. Physiol., Emory Univ., Atlanta, Ga.). *Am. J. Physiol.* 226(6):1408-1412, 1974.

A study was undertaken to further identify the mechanism of theophylline action as a stimulator of both hydrogen ion secretion and respiration by *in vitro* frog gastric mucosa, particularly with regard to its substrate mobilizing capability. The dose-response curves for the parameters of acid secretion and respiration were strikingly similar. Control experiments indicated that the use of a carbonate- or bicarbonate-free medium for measuring respiration does not significantly alter the relation between respiration and acid secretion. Optical measurements of the redox state of the respiratory chain components showed an increased level of cytochrome reduction in response to theophylline. Kinetic measurements showed that the cytochrome reduction occurs prior to the acid secretory response to theophylline. Thus theophylline acts, probably by cyclic AMP, to mobilize endogenous metabolic substrates as a primary mechanism of action. Measuring the respiratory quotient before and after theophylline stimulation showed a significant decrease in respiratory quotient which could not be explained by simply the observed increase in oxygen consumption. Thus it is proposed that theophylline acts by mobilizing endogenous fatty acids and that the oxidation of the fatty acids plays a specific and direct role in the secretion of acid by this tissue.

6616 THE INFLUENCE OF VITAMINS, AMINO ACIDS AND FATTY ACIDS ON THE HYDROCHLORIC ACID SECRETION OF THE ISOLATED GASTRIC MUCOSA. *(E.)*

Pokrovsky, A. A.; Levin, L. G.; Gapparov, M. M. (Inst. Nutr., Moscow, USSR). *Int. J. Vitam. Nutr. Res.* 43(2):233-241, 1973.

The secretion rate, the level of nicotinamide adenine dinucleotide phosphate fluorescence, and the oxygen consumption of the isolated gastric mucosa of frogs (*Rana radibunda*) were measured in the presence of different nutrients, substrates, and inhibitors of a respiratory chain. Of the 19 amino acids tested, only glutamic acid (10 mM) and l-methionine (100 μM) had a distinct stimulating effect on H^+ secretion. Unsaturated fatty acids (linoleic and arachidonic acids) had a stimulating effect at 1 mM, whereas a saturated fatty acid (palmitic acid) did not have a marked influence in H^+ secretion in the gastric mucosa. Among vitamins, thiamine and biotin (250 μM) had a marked stimulating effect; vitamin D and vitamin A (10-500 μg/ml) inhibited H^+ secretion. The inhibitory effect of vitamin A was less pronounced. These results are useful in considering the mechanism of chemical regulation of the acid secretion of the gastric mucosa. Certain nutrients appear to have direct regulatory action on the HCl secretion only after their absorption in the blood during the second phase of the HCl secretion. In all cases, the stimulation of H^+ secretion is closely connected to the oxidative metabolism and the redox level of pyridine nucleotide in the gastric mucosa. Nutrients may exert a stimulating effect on HCl secretion in two ways: first, they may be used as substrates (glutamic acid, fatty acids and Krebs cycle substrates) for biological oxidation. Second, the nutrients (thiamine and biotin) may participate in the process of HCl synthesis as cofactor.

6617 ADENYL CYCLASE STIMULATION BY ASPIRIN IN RAT GASTRIC MUCOSA. *(E.)*

Mangla, J. C.; Kim, Y. M.; Rubulis, A. A. (Monroe Community Hosp., Rochester, N.Y.). *Nature (Lond.)* 250(5461):61-62, 1974.

The effects of aspirin on gastric mucosal adenyl cyclase were studied in male Holtzman rats given aspirin p.o. by stomach tube (150-300 mg/kg homogenized in 1% methyl cellulose). Animals were sacrificed after 5 min to 5 hr. At the highest dose, stimulation of adenyl cyclase was apparent within 5 min of aspirin administration. Enzyme stimulation was maximum after 4 hr and was significantly different from the control value. At the lowest dose, aspirin gave comparable results 30 min after p.o. administration. In *in vitro* studies, 0.3, 0.6, 0.9, 1.2, or 1.8 mg aspirin/0.38 ml reaction mixture was added to gastric mucosal homogenate from 24 rats. There was a direct correlation between aspirin concentration and degree of adenyl cyclase activity, which increased linearly with concentrations up to 1.8 mg aspirin in 0.38 ml reaction mixture. If cyclic AMP stimulates gastric acid secretion, stimulation of adenyl cyclase by aspirin may explain mucosal injury associated with aspirin consumption. Should cyclic AMP inhibit gastric secretion, this may be another explanation for the hypoacidity seen after injury by aspirin. It is also possible that adenyl cyclase stimulation by aspirin quickly exhausts ATP stores, thus causing mucosal injury.

6618 PLASMA PROTEIN SHEDDING BY THE CANINE OXYNTIC GLANDULAR MUCOSA INDUCED BY TOPICAL APPLICATION OF SNAKE VENOMS AND ETHANOL. *(E.)*

Davenport, H. W. (Dept. Physiol., Univ. Michigan, Ann Arbor). *Gastroenterology* 67(2):264-270, 1974.

In 15 female dogs, a single irrigation of an oxyntic glandular mucosa pouch of the stomach with dilute solution (0.5 mg/ml) of lyophilized venom of the hooded cobra (*Naja naja*) broke the gastric mucosal barrier, as shown by the large increase in Na^+ output, but shedding of plasma did not occur. Twenty to 40 days later, a similar irrigation caused a very large shedding of plasma through the mucosa (over 30 ml/30 min). The degree of shedding declined during the next 30 days, with various amounts of residual plasma shedding still occurring. At essentially zero response, irrigation with cobra venom still broke the gastric mucosal barrier. Treatment for 7-14 days with prednisolone tertiary butylacetate (1 mg/kg/day, i.m.) attentuated but did not abolish plasma shedding with venom irrigation. Ethanol irrigation (30% v/v) also caused plasma shedding whether or not the mucosa had previously shed plasma in response to venom irrigation. A dilute solution (0.5 mg/ml) of lyophilized venom from Russell's viper did not induce shedding by itself but did so after irrigation with ethanol. Mucosal irrigation with numerous other foreign proteins (egg albumin, conalbumin, milk proteins, gluten fragments inducing gluten enteropathy, trypsin, urease, and papain) combined with various barrier breakers (digitonin, acetic acid, urea, salicylic acid, and cobra venom) did not achieve induction of plasma shedding. Present results do not substantiate the theory involving the following series of events: (1) breaking of gastric barrier by venom; (2) production of immune response by antigen acting venom; (3) release of histamine as part of immune response; and (4) induction of reactions including plasma shedding by histamine.

6619 EFFECT OF ORAL ADMINISTRATION OF DEGRADED CARRAGEENAN ON THE INDUCTION OF GASTRIC ULCERS IN RATS TREATED WITH GLUCOCORTICOIDS.

(E.) Emerson, L.; Kerkut, G. A. (Dept. Physiol. Biochem., Univ. Southampton, England). *J. Comp. Pathol.* 84(2): 151-160, 1974.

Female Wistar rats, fasted through the experimental period, were injected s.c. with fluocortolone or difluocortolone trimethyl acetate (10, 25, or 50 mg/kg/day) for 4 days or with prednisolone or difluocortolone (25 or 50 mg/kg/day) for 4 days. To determine its inhibitory effect on ulcerogenicity of the glucocorticoids, degraded carrageenan was administered p.o. by intubation (400 mg/kg) immediately prior to the daily injection of one of the glucocorticoids. Prednisolone was the least potent ulcerating agent, followed by increasing levels of ulcerogenicity with fluocortolone, difluocortolone, and difluocortolone trimethyl acetate. The severity of ulceration was dose-related. Carrageenan pretreatment significantly reduced ulcer severity in rats receiving fluocortolone, difluocortolone, and difluocortolone trimethyl acetate; severity of ulceration produced by prednisolone was not affected by carrageenan. Histologically, mucosal ulceration in carrageenan-treated rats was more superficial than in rats given the glucosteroids alone. Although erosion was extensive in some cases, the lesions never penetrated the muscularis mucosa. The exact mode of action of degraded carrageenan remains to be elucidated.

6620 HYPOTHERMIA IN RESTRAINT-INDUCED GASTRIC ULCERS IN PARABIOTIC RATS.

(E.) Tran, T. A.; Gregg, R. V. (Univ. Louisville Sch. Med., Ky.). *Gastroenterology* 67(2):271-275, 1974.

Colonic body temperatures of adult female ARS Fischer 344 rats were monitored in restrained and unrestrained animals as well as in restrained and unrestrained parabiosed rat pairs. Environmental temperature was 22 C. Restrained animals, whether single or parabiosed, all developed macroscopic ulcerations and showed a mean drop in body temperature of 6.3 C after 24-30 hr of immobilization from initial readings of 37.3 C. Body temperatures of unrestrained parabiosed rats that ulcerated macroscopically within 28-30 hr dropped 4.5 C. However, body temperatures of unrestrained rats that developed no ulcers or only microscopic ulcers decreased only 3.5 C by the 9th hr of restraint, and gradually returned to control values by the 12th hr. These results clearly demonstrate hypothermia in rats subjected to restraint. Whether the hypothermia in restrained and unrestrained parabiosed rats is secondary to factors causing gastric mucosal alterations, or plays a causative role, is currently under investigation.

6621 PROPHYLAXIS BY VITAMIN C IN STARVATION INDUCED RAT STOMACH ULCERATION.

(E.) Cheney, C. C.; Rudrud, E. (Dept. Psychol., Utah State Univ., Logan). *Life Sci.* 14(11):2209-2214, 1974.

Long-Evans female rats were randomly divided into 4 groups of 20 each: (1) controls with free access to food and water but no vitamin administration; (2) starved; (3) starved with administration of deactivated ascorbic acid (6 g/200 ml drinking water); or (4) starved with administration of active ascorbic acid. The vitamin was also provided for 8 days prior to starvation. Sacrifice occurred after 6 days or when weight loss was 30%. Control animals developed no ulcers and animals receiving active ascorbic acid showed only 4 ulcers with mild or moderate lesions. In contrast, group 2 rats had 20 ulcers, of which 16 were severe. Rats receiving deactivated ascorbic acid demonstrated 17 ulcerations: 6 severe, 6 moderate, and 5 mild. These results strongly suggest that active L-ascorbic acid taken p.o. is effective in protecting the animals against starvation-induced ulceration. It is not clear whether the tissues were at saturation and whether the protection would last indefinitely.

6622 QUANTITATIVE HISTOLOGIC DISTRIBUTION OF ADENOSINE-3',5'-MONOPHOSPHATE IN THE RAT STOMACH. IMPROVED PROCEDURE FOR THE LUMINESCENCE ASSAY.

(E.) Glick, D.; Katsumata, Y.; von Redlich, D. (Stanford Univ. Med. Sch., Calif.). *J. Histochem. Cytochem.* 22(6):395-400, 1974.

Procedural improvements in the luminescence method for determining adenosine-3',5'-monophosphate (cAMP) in submilligram samples were developed for purposes of technical simplification, time saving, and increased analytical precision. The improved method has been applied to the determination of the quantitative histologic distribution of cAMP in the body of the glandular stomach of fed and fasted Sprague-Dawley male rats. In fasted rats, a sharp peak in cAMP concentration (0.12 pmole/μg protein-nitrogen, about 3.3 pmoles/mg wet weight) was noted in the parietal mucous neck cell zone. The values fell rapidly to about ½ peak value in the chief cell region and remained in this range into the muscle layer. In fed rats, second and third peaks appeared in the chief cell and muscle zones, each about 10% less than the first peak. The histologic position and height of the first peak did not change significantly from that in the fasted state. Homogenates of glandular stomach of fed rats had cAMP values in the range 1.9 to 2.4 pM/mg wet weight. Literature findings that histamine formed in the chief cell region may be available to the parietal cell for stim-

lation of acid section would be compatible with the
AMP concentration (0.12 pM/μg protein-nitrogen,
bout 3.3 pM/mg wet weight) was noted in the pa-
rease of cAMP concentration in the stomach muscle
n the fed, compared with the fasted rat, may be re-
ated to the role of cAMP in motility of the organ.

6623 SEPARATION OF PROLIFERATIVE AND MATURE CELLS IN STOMACH, JEJUNUM AND COLON OF RAT. *(E.)* Schmidt, M.; Lipkin, M. (Mem. Sloan Kettering Cancer Ctr., New York, N.Y.). *Proc. Soc. Exp. Biol. Med.* 146(3):836-839, 1974.

A tissue-planing method has been modified in such a way as to allow mature, well-differentiated cells lining the surface of the stomach and the distal colon to be separated from immature cells in the deeper layers of the mucosa. The upper 6 cm of jejunum or terminal 6 cm of colon were removed from male CFE rats. A segment of jejunum was mounted on a lucite block, causing it to open lengthwise and allowing the villi to protrude upward. A sliding micrometer-mounter razor blade moved horizontally across the tissue to cut off the villus layers. For separation of cells in descending colon and stomach segments, new tissue supporting blocks were necessary to stretch the tissues enough to eliminate diagonal folds and the gastric rugae. Incorporation of thymidine-^{3}H-methyl into DNA was greatest in cells in the area below the surface of the mucosa occupied by proliferating cells, at 1 hr after injection. Labeled cells then moved outward toward the surface of the mucosa where the amount of label increased at 24 and 72 hr. Thymidine kinase activity fell markedly as cells migrated from crypt to villus, and in colon and stomach thymidine kinase activity also decreased in migrating and differentiating cells. By enabling separation of proliferating and differentiating gastrointestinal cells in different regions, this method will permit the study of factors influencing mechanisms of carcinogenesis and other proliferative and differentiation-specific characteristics of the cells.

6624 COMPARATIVE EFFECTS OF INHIBITORS OF GASTRIC SECRETION ON THE PATTERNS OF SECRETION AND GASTRIC MUCOSAL BLOOD FLOW IN UNANESTHETIZED DOGS. *(E.)* Torchiana, M. L.; Cook, P.; Lagerquist, B.; Reese, S. (Merck Inst. Therap. Res., West Point, Pa.). *Pharmacologist* 16(2):313, 1974.

6625 DISTRIBUTION OF CHLORPROMAZINE IN THE GASTROINTESTINAL TRACT OF THE RAT AND ITS EFFECT ON ABSORPTIVE FUNCTION. *(E.)* Sundaresan, P. R.; Rivera-Calimlim, L. (Univ. Rochester Sch. Med., N.Y.). *Pharmacologist* 16(2):313, 1974.

6626 THE EFFECT OF HYPERTONIC SALINE ON THE UPTAKE OF TRITIATED 7,12-DIMETHYLBENZ(a)-ANTHRACENE BY THE GASTRIC MUCOSA. *(E.)* Capoferro, R.; Torgersen, O. (Rikshosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(4):343-349, 1974.

6627 ANTI-DIARRHEAL AND GASTRIC ANTI-SECRETORY ACTIVITY OF McN-1014-11. *(E.)* Jacoby, H. I.; Hageman, W. E. (McNeil Lab., Fort Washington, Pa.). *Pharmacologist* 16(2):313, 1974.

6628 EFFECTS OF Shigella flexneri LIPOPOLYSACCHARIDE (SFL) ON ACETYLCHOLINE CONTRACTIONS AND ^{45}CA FLUXES OF ISOLATED RAT GASTRIC SMOOTH MUSCLE. *(E.)* Hava, M. (Peoria Sch. Med., Ill.). *Pharmacologist* 16(2):313, 1974.

6629 FORMATION OF LYSINE FROM α,ε-DIAMINOPIMELIC ACID AND NEGLIGIBLE SYNTHESIS OF LYSINE FROM SOME OTHER PRECURSORS BY RUMEN CILIATE PROTOZOA. *(E.)* Onodera, R.; Kandatsu, M. (Dept. Agric. Chem., Miyazaki Univ., Japan). *Agr. Biol. Chem.* 38(5):913-920, 1974.

6630 FORMATION OF LYSINE FROM α,ε-DIAMINOPIMELIC ACID CONTAINED IN RUMEN BACTERIAL CELL WALLS BY RUMEN CILIATE PROTOZOA. *(E.)* Onodera, R.; Shinjo, T.; Kandatsu, M. (Dept. Agr. Chem., Miyazaki Univ., Japan). *Agr. Biol. Chem.* 38(5):921-926, 1974.

6631 POTENTIATION OF GASTRIC ACID SECRETION INDUCED BY VARIOUS DOSES OF PENTAGASTRIN BY USING A SUBTHRESHOLD DOSE OF METHACHOLINE. *(Hung.)* Varro, V.; Kiss, J.; Mignon, M. (2nd Clin. Internal Med., Szeged Med. Univ., Hungary). *Kiserletes Orvostudomany* 25(2):133-136, 1973.

6632 STIMULATION OF A LONG-LASTING GASTRIC ACID SECRETION WHICH IS VAGUS IN NATURE BY INFUSING 2-DEOXY-D-GLUCOSE IN DOGS. *(Hung.)* Mignon, M.; Vatier, J.; Bonfils, S.; Varro, V. (Ctr. Gastroenterol. Res., INSERM, Paris, France). *Kiserletes Orvostudomany* 25(2):121-126, 1973.

6633 EFFECT OF STIMULATING THE TERMINAL SMALL INTESTINE ON GASTRIC ACID SECRETION IN RATS. *(Hung.)* Rozsos, I.; Merchenthaler, I.; Horvath, S. (Inst. Anat., Pecs Med. Univ., Hungary). *Kiserletes Orvostudomany* 25(3):279-283, 1973.

6634 EFFECT OF HYPOCALCEMIA ON BASAL GASTRIC SECRETION. *(Cz.)* Blahos, J.; Mertl, L.; Gregor, O.; Mazac, V.; Blaha, J.; Blahosova, A.; Reisenauer, R. (Fac. Pediatr. Med., Charles Univ., Prague, Czechoslovakia). *Cas. Lek. Cesk.* 112(36):1099-1103, 1973.

6635 EFFECT OF HYDROCORTISONE ON THE TOTAL LIPID AND GLYCOGEN CONTENT OF THE GASTRIC MUCOSA.
(Ukr.) Myel'okhina, N. I. (Kiev Med. Inst., USSR). *Fiziol. Zh.* 19(6):832-834, 1973.

6636 ENDOGENOUS GASTRIN AND INSULIN SECRETION IN MAN: EFFECT OF GASTRIC ALKALINIZATION.
(It.) Zimbaro, G.; Ferrau, O.; Familiari, L.; Consolo, F. (Inst. Hum. Physiol. Systematic Med. Ther., Univ. Messina, Italy). *Boll. Soc. Ital. Biol. Sper.* 49(14):896-901, 1973.

See also, 6517, 6557, 6583, 6762, 6857, 6894.

SECRETION AND METABOLISM

Pancreas

6637 THE KINETICS OF PANCREATIC AMYLASE SECRETION AND ITS RELATIONSHIP TO VOLUME FLOW AND ELECTRICAL CONDUCTANCE IN THE ANAESTHETIZED CAT.
(E.) Greenwell, J. R.; Scratcherd, T. (Univ. Newcastle Med. Sch., Tyne, England). *J. Physiol. (Lond.)* 239(3):443-457, 1974.

Experiments were designed to relate the kinetics of amylase secretion to volume flow and the transverse electrical conductance across the pancreas. Enzyme secretion in response to short duration vagal stimulation or to rapid i.v. injections of cholecystokinin-pancreozymin or gastrin, or to intra-arterial injections of acetylcholine is a function of the volume of juice secreted and not primarily a function of time. Regardless of the rate of background, secretin stimulated flow of water and electrolyte. The output of amylase in response to each stimulus occurred in a constant volume of about 15 drops (0.5 ml). Because amylase secretion occurs in this constant volume, it is suggested that the secretion is due to the rapid secretion of enzyme into the duct system from the acini, and subsequent stimulation of water and bicarbonate secretion by secretin which washes the enzyme from the duct system. An increase in the electrical conductance occurs across the tail of the pancreas when enzyme secretion is stimulated. This increased conductance has two components: an early peak associated with the extrusion of enzyme from the acinar cell, and a later peak which is probably due to vasodilatation. Atropine had no effect on either the enzyme secretion or the conductance record when the stimulant was cholecystokinin-pancreozymin. Atropine blocked enzyme secretion and both peaks of the conductance record in response to acetylcholine stimulation. For vagal stimulation atropine blocked enzyme secretion and abolished the early phase of the conductance record. It had no effect on the later peak, indicating an atropine-resistant vasodilation of the pancreatic vessels. When the vagus is stimulated on a background of submaximal electrolyte secretion caused by the i.v. infusion of gastrin, the volume rate of secretion and the rate of amylase secretion follow a similar time course. The maximal volume response occurred between 7 Hz and 15 Hz, and the maximal amylase output impulse occurred at 5 Hz.

6638 PANCREATIC SECRETION IN RESPONSE TO JEJUNAL FEEDING OF ELEMENTAL DIET. *(E.)*
Cassim, M. M.; Allardyce, D. B. (Dept. Surg., Univ. British Columbia, Vancouver, Canada). *Ann. Surg.* 180(2):228-231, 1974.

A study was made in dogs to determine the effect of elemental and blenderized ward diets, infused throug a jejunostomy, on pancreatic secretion. The dogs were prepared with Thomas cannulae in the stomach, duodenum and proximal jejunum. The main pancreatic duct was cannulated and the catheter allowed to lie in the duodenum. A stable 50% of maximum pancreatic secretory response was obtained by infusion of secretin (3 μg/kg) and pancreozymin-cholecystokinin (6 μg/kg) before tube feeding. Jejunostomy feeding with the elemental diet significantly increased the volume and bicarbonate content of pancreatic secretion above the 50% of maximum plateau, but the protein content of pancreatic juice decreased. Unlike the elemental diet the blenderized diet also increased the protein content of the pancreatic secretion. Although the elemental diet infused through a jejunostomy did not "rest" the pancreas, it may be advantageous for use in feeding patients with acute pancreatitis.

6639 DIRECT AND INDIRECT EFFECTS OF NICOTINE ON RABBIT PANCREATIC SECRETION. *(E.)*
Solomon, T. E.; Solomon, N.; Shanbour, L. L.; Jacobson, E. D. (Univ. Texas Sch. Med., Houston). *Gastroenterology* 67(2):276-283, 1974.

In vitro and *in vivo* preparations of rabbit pancreas were used to determine whether nicotine acts directly on the pancreas to inhibit exocrine secretion, or whether this inhibition is mediated by release of endogenous substances. Very high nicotine concentrations (1.6 mg/ml in the bathing fluid) were required to produce significant declines in *in vitro* secretory volume and bicarbonate output. There was concomitant depression of cellular ATP levels. These direct *in vitro* effects represent nonspecific toxic effects on cell metabolism since much lower plasma concentrations of nicotine inhibited secretion *in vivo* without depressing tissue metabolism. In *in vivo* studies, i.v. infusion of nicotine (100, 200, 400 μg/kg/hr for 1 hr) inhibited flow rate and bicarbonate concentration and output in a dose-dependen fashion. At the 2 higher doses, the volume and bicarbonate output after nicotine infusion were significantly above the prenicotine values. These results suggest that nicotine is not the final mediator of the inhibitory effects of smoking on pancreatic secretion. Norepinephrine (2 or 4 μg/kg/min i.v., for 30 min) inhibited secretory flow and bicarbonate output. Mean systemic arterial blood pressure rose rapidly and then declined slowly to a value 11 mm Hg higher than before norepinephrine administration. Epinephrine (2 μg/kg/min i.v.) produced similar effects. Phenoxybenzamine (1 mg/kg) infused over 20 min decreased blood pressure, and significantly increased water and bicarbonate secretion. After a 40-min stabilization period after phenoxybenzamine infusion, neither nicotine (200 μg/kg/hr, 1 hr) nor norepinephrine (4 μg/kg/min for 30 min before or after nicotine) had any effect on pancreatic secretion. The results support the role of catecholamines in nicotine-induced inhibition of pancreatic exocrine secretion of water and bicarbonate. The previously observed failure of phenoxybenzamine to prevent inhibition of pancreatic secretion evoked by ethanol indicates that phenoxybenzamine produced specific blockade to the effects of norepinephrine and nicotine. Apparently, nicotine depresses pancreatic secretion through adrenergic mediators. This indirect action of nicotine explains the disparity between the *in vitro* and *in vivo* results and suggests a possible relation between the sympathetic nervous system and the pancreas, at least in terms of the pathogenesis of duodenal ulcer in the cigarette smoker.

6640 RADIOIMMUNOASSAY FOR HUMAN PANCREATIC CARBOXYPEPTIDASE B IN SERUM. *(E.)* Geokas, M. C.; Rinderknecht, H. (Sepulveda VA Hosp., Los Angeles, Calif.). *Gastroenterology* 66(4):697, 1974.

6641 FURTHER EVIDENCE THAT SECRETIN STIMULATES PANCREATIC SECRETION THROUGH ADENOSINE 3,5'-MONOPHOSPHATE (CYCLIC AMP). *(E.)* Bonting, S. L.; Case, R. M.; DePont, J. J. H. H. M.; Kempen, H. J. M.; Scratcherd, T.; (Dept. Biochem., Univ. Nijmegen, Netherlands). *J. Physiol. (Lond.)* 240(2):34P-35P, 1974.

6642 THE EFFECT OF EXPERIMENTAL VARIATION IN THE QUANTITY OF PANCREATIC SECRETION ON THE DIGESTION AND UTILIZATION OF MILK-SUBSTITUTE DIETS BY THE CALF. *(E.)* Ternouth, J. H.; Roy, J. H. B.; Stobo, I. J. F.; Ganderton, P.; Gillies, C. M.; Shotton, S. M.;(Dept. Animal Husb., Univ. Queensland, St. Lucia, Australia). *Br. J. Nutr.* 32(1):37-45, 1974.

6643 COMPOSITION OF GUINEA PIG PANCREATIC ZYMOGEN GRANULES: CALCIUM AND MAGNESIUM CONCENTRATION. *(E.)* Clemente, F.; Meldolesi, J.; Guy, O.; Sarles, H. (INSERM, Marseilles, France). *Digestion* 10(3):214-215, 1974.

6644 STUDIES ON THE APPEARANCE OF A ZINC-BINDING PROTEIN IN RAT PANCREAS. *(E.)* Davies, N. T.; Bremner, I. (Roswett Res. Inst., Aberdeen, Scotland). *Biochem. Soc. Trans.* 2(4):654-656, 1974.

6645 SPECIFIC HORMONAL REGULATION BY FOOD OF THE PANCREATIC ENZYMATIC SECRETION. *(E.)* Dick, J.; Felber, J. P. (Nestle Hosp., Lausanne, Switzerland). *Experientia* 30(6):678, 1974.

6646 PILOCARPINE STIMULATION OF EXOCRINE PANCREAS SECRETION IN VITRO. *(E.)* Nevalainen, T. J.; Janigan, D. T. (Dept. Path., Dalhousie Univ., Halifax, Nova Scotia, Canada). *Res. Exp. Med. (Berl.)* 162(2):161-167, 1974.

6647 DNA SYNTHESIS IN VARIOUS EXOCRINE CELLS IN THE INTACT PANCREAS OF ALBINO RATS. *(Rus.)* Poliakova, T. I. (Leningrad Med. Inst., Sanitation Hyg., USSR). *Biull. Eksp. Biol. Med.* 78(7):117-120, 1974.

6648 INTERACTION OF GASTROINTESTINAL HORMONES IN RAT PANCREATIC CELLS. *(Fr.)* Robberecht, P.; Deschodt-Lanckman, M.; De Neef, P.; Christophe, J. (Fac. Med., Univ. Brussels, Belgium). *Arch. Int. Physiol. Biochim.* 82(1):196, 1974.

6649 BIOCHEMICAL STUDY AND ULTRASTRUCTURAL CORRELATION OF THE EXTRUSION OF ENZYMATIC PROTEINS IN THE EXOCRINE PANCREAS. *(Fr.)* Vincent, D.; Potvliege, P.; Bauduin, H. (Dept. Pharmacol., Free Univ., Brussels, Belgium). *Arch. Int. Physiol. Biochim.* 82(1):208, 1974.

6650 CYCLIC AMP AND CYCLIC GMP CONTENTS OF THE RAT PANCREAS STIMULATED IN VIVO AND IN VITRO BY GASTROINTESTINAL HORMONES. *(Fr.)* Deschodt-Lanckman, M.; Robberecht, P.; De Neef, P.; Christophe, J. (Fac. Med., Univ. Brussels, Belgium). *Arch. Int. Physiol. Biochim.* 82(1):180, 1974.

See also, 6534.

SECRETION AND METABOLISM

Hepatobiliary Tract

6651 INFLUENCE OF PORTACAVAL SHUNT ON BILE FORMATION IN THE RAT. *(E.)* Prandi, D.; Dumont, M.; Erlinger, S. (Beaujon Hosp., Clichy, France). *Eur. J. Clin. Invest.* 4(3):197-200, 1974.

Bile flow and bile acid secretion were measured in male Charles River rats 21-28 days after a portacaval shunt and in sham-operated and normal animals. Bile flow was significantly lower (6.65 ± 0.36 μl/min/100

g) in the shunted rats than in the sham-operated animals (8.21 ± 0.21 μl/min/100 g). Bile acid secretion was not significantly different in shunted rats (0.27 ± 0.03 μM/min/100 g) and sham-operated rats (0.26 ± 0.02 μM/min/100 g). During bile acid infusions (sodium taurocholate, 0.2-0.7 μM/min/100 g), there was a linear relation between bile flow and bile acid excretion in both groups of animals. The slope of the relation was similar, suggesting that the osmotic activity of the bile acids was not modified in the shunted animals. The bile acid-independent flow, estimated by the extrapolation of this relation to a zero bile acid excretion, was significantly lower in rats with a portacaval shunt (5.20 ± 0.40 μl/min/100 g) than in sham-operated controls (6.50 ± 0.30 μl/min/100 g). Liver weight was significantly lower in shunted than in sham-operated animals, and there was a parallel decrease of liver weight (-17%) and of the bile acid-independent flow (-22%). No difference was found between the sham-operated rats and the normal rats. It is concluded that the decreased bile flow in animals with a portacaval shunt was due to the decrease in the bile acid-independent flow. Since bile acid secretion rate remained unchanged, the secretion of bile acids and the bile acid-independent flow may be regulated by separate mechanisms.

6652 A COMPARISON BETWEEN THE BILE ACID CONCENTRATION AND THE INORGANIC CATION-ANION DIFFERENCE IN DOG BILE. *(E.)* Kutz, K.; Paumgartner, G.; Egger, G.; Preisig, R. (Dept. Clin. Pharmacol., Univ. Berne, Switzerland). *Gastroenterology* 67(1): 135-141, 1974.

The relation between the difference of inorganic cations [$Na^+ + K^+$] and anions [$Cl^- + HCO_3^-$] and enzymatically determined bile acids in bile was studied in the unanesthetized dog equipped with a Thomas duodenal cannula. Bile composition was analyzed during biliary drainage with and without i.v. infusion of sodium taurocholate (12-72 μEq/min). Similar investigations were carried out after administration of choleretic agents such as secretin (0.05-0.2 U/min), lypressin (0.5 U/kg), ouabain (0.02 mg/kg), and insulin (1 U/kg). Over a wide range of bile acid concentrations (approximately 50 to 150 mEq/liter), the electrolyte difference yielded a satisfactory approximation of bile acid content in dog bile. At low bile acid concentrations (below 50 mEq per liter), however, the cation-anion difference overestimated bile acids.

6653 EFFECT OF PHENOBARBITAL TREATMENT ON TOTAL AND INDIVIDUAL BILE ACIDS IN THE SERUM AND LIVER OF NORMAL RATS AND RATS WITH CHOLESTASIS INDUCED BY α-NAPHTHYLISOTHIOCYANATE. *(Ger.)* Leinweber, W.; Muhlenkamp, H.; Erb, W. (Ctr. Internal Med., Univ. Frankfurt/Main, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:955-956, 1973.

Bile acids were determined in the serum and livers of female Sprague-Dawley rats given phenobarbital (50 mg/kg i.p. twice a day for 8 days) and on rats given phenobarbital and α-naphthylisothiocyanate (ANIT; 100 mg/kg p.o.). Phenobarbital significantly decreased total serum bile acids from 3.7 to 1.8 μg/ml, largely by decreasing cholic acid concentrations. Significant decreases also occurred in deoxycholic and β-methylcholanic acids. Total bile acids also decreased significantly in the liver (from 95 to 66 μg/g), but the only bile acid which decreased significantly was deoxycholic acid. A comparison of the relative percentages of individual bile acids revealed that phenobarbital decreases cholic acid and increases chenodeoxycholic acid levels in both serum and liver. The decrease in bile acid levels may be due to an increase in their excretion in the bile and stools. Administration of ANIT alone produced large increases in total bile acids, cholic and chenodeoxycholic acids, and particularly in β-methylcholanic acid. Phenobarbital pretreatment caused an additional increase in total serum bile acids with a decrease in cholic acid, significant increases in chenodeoxycholic and α-methylcholanic acid, and a slight increase in β-methylcholanic acid. In contrast to findings in humans with cholestasis, phenobarbital did not reduce serum bile acids in rats with ANIT-induced cholestasis. The increases in chenodeoxycholic, α-methylcholanic, and β-methylcholanic acids in ANIT-induced cholestasis suggests that bile acids can be synthesized without 12-α-hydroxylation. It is suggested that normal rats can control this increase by excreting increased quantities of bile acids.

6654 STUDIES ON BILE SECRETION WITH THE AID OF THE ISOLATED PERFUSED RAT LIVER. I. INHIBITORY ACTION OF SPORIDESMIN AND ICTEROGENIN. *(E.)* Bullock, G.; Eakins, M. N.; Sawyer, B. C.; Slater, T. F. (C.I.B.A. Lab., Horsham, England). *Proc. R. Soc. Lond. (Biol.)* 186(1085):333-356, 1974.

An isolated perfused liver technique was developed to study the mechanisms underlying bile secretion and th cholestatic actions of icterogenin and sporidesmin. The perfusion medium was a Krebs-Ringer bicarbonate buffer containing bovine serum albumin (5 g%), D-glucose (11 mM), amino acids, sodium lactate (1.5 mm), defibrinated blood from the same albino strain as liver donors (25 ml/100 ml), and streptomycin (7.5 mg). The perfused liver produced bile for 3-5 hr at a stea rate slightly above that in intact rats possessing external biliary cannulae. The addition of ethanol (final concentration 27 mM) to control perfusion had no significant effect on bile flow or liver morphology other than a decrease in the numbers of multi- and mono-vesicular bodies and in their relative proportio in the cytoplasms. There was a large, transient increase in perfusate lactate to pyruvate ratio and a sharp fall in the perfusate pH. Sporidesmin (2 mg in ethanol-buffer solution) rapidly decreased bile flow and retarded the increase in the lactate to pyruvate ratio and the decrease in perfusate pH seen in ethano controls. Electron micrographs of livers after sporidesmin administration showed large regions of the bile canaliculi devoid of microvilli and the appearance in the cytoplasms of lysosomal-like structures containing numerous glycogen granules. Icterogenin (4 mg in ethanol-buffer solution) produced a rapid cholestasis and inhibited the changes in lactate to pyruvate ratio and perfusate pH seen in ethanol preparations. Electron micrographs of icterogenin-treated livers revealed changes in the canalicular membrane, extrusion of material into the canalicular lumen, and aggregation of lysosomes in the cytoplasm. These studies suggest that bile flow in the rat is seriously affected by disturbances to the canalicular membrane.

6655 BILE ACID METABOLISM IN MAMMALS: VI. EFFECT OF ETHIONINE UPON BILE ACIDS OF RAT BILE. *(E.)* Yousef, I. M.; Kakis, G.; Fisher, M. M. (Dept. Med., Univ. Toronto, Canada). *Lipids* 9(6): 407-414, 1974.

The bile ducts of 12 male and 12 female Wistar rats were cannulated. After 1 hr of bile collection, 6 rats of each sex were given ethionine (1 mg/g) by feeding tube. The bile acid composition of the bile collected during the subsequent 4 hr was analyzed by combined thin layer and gas chromatography. Ethionine reduced bile flow (3rd and 4th hr) and bile acid concentration (4th hr) in female rats. The amino acid had no effect on bile flow in male rats but did decrease biliary secretion of bile acids (1st and 2nd hr). Cholic acid accounted for the bulk of the reduction in total bile acid secretion in females. The increase in total bile acid secretion in males involved all bile acids. The effects of ethionine on bile acid secretion were delayed in female rats, immediate in the males. The changes in bile acid secretion involved only the taurine conjugates in the female studies compared with both taurine and glycine conjugates in the male. These results demonstrate substantial sex differences in the effect of ethionine on bile acid metabolism in the rat.

6656 THE CONTROL OF BILE ACID POOL SIZE: EFFECT OF JEJUNAL RESECTION AND PHENOBARBITONE ON BILE ACID METABOLISM IN THE RAT. *(E.)* Mok, H. Y. I.; Perry, P. M.; Dowling, R. H. (Guy's Hosp. Med. Sch., London, England). *Gut* 15(4):247-253, 1974.

In patients with cholesterol gallstones, there is a diminished bile acid pool and the bile becomes supersaturated with cholesterol. Medical treatment has been aimed at re-expanding the pool to improve cholesterol solubility in bile but as yet the factors controlling the size of the bile acid pool are unknown. Therefore the role of the liver and intestine in controlling bile acid pool size in female Wistar rats was studied and the effect of experimental expansion of the pool on bile acid metabolism and bile lipid composition examined. Bile acid absorption was increased from ileum made hyperplastic by previous jejunectomy and hepatic bile acid synthesis was increased by phenobarbital treatment (1 mg/ml drinking water). Both jejunal resection and phenobarbital significantly increased the size of the bile acid pool from 32.2 ± 0.94 μM/100 g body weight to 42.4 ± 1.71 and 44.4 ± 2.03 resp. However, the effects of these experimental manipulations on bile acid secretion rate, enterohepatic cycling frequency, and synthesis rates were quite different. Jejunectomy caused a 56% increase in bile acid secretion and more rapid cycling of the bile acid pool but the enhanced absorption did not depress bile acid synthesis. In contrast, phenobarbital markedly increased synthesis from 14.5 ± 1.42 μM/100 g/24 hr to 25.9 ± 3.19, but there was no significant change in bile acid secretion and the choleresis seen after phenobarbital was mainly due to an increase in the bile acid-independent fraction of bile flow. In these experimental studies in the rat, expansion of the bile acid pool did not significantly change bile lipid composition or cholesterol solubility in bile.

6657 THE ENHANCEMENT OF MAXIMAL BILIRUBIN EXCRETION WITH TAUROCHOLATE-INDUCED INCREMENTS IN BILE FORM. *(E.)* Goresky, C. A.; Haddad, H. H.; Kluger, W. S.; Nadeau, B. E.; Bach, G. G. (Montreal Gen. Hosp., Quebec). *Can. J. Physiol. Pharmacol.* 52(3):389-403, 1974.

Of the processes involved in the handling of a bilirubin load, the biliary secretory maximum or Tm for bilirubin has been regarded as rate limiting and as a characteristic of liver function. In the present study, bile flow was varied by use of bile acid infusions to determine whether the Tm is indeed constant or whether it varies with flow. Anesthetized dogs, with bile flow stabilized by cholinergic blockade, were studied during taurocholate infusions. In these animals the ductular component of flow is relatively inhibited and the bile flow rate increases approximately in proportion to the rate of excretion of taurocholate. The maximal biliary excretion rate of bilirubin increased linearly with flow and taurocholate excretion, in a significant fashion, but, in contrast to the relation between taurocholate excretion and flow, a significantly large intercept remained on linear extrapolation toward zero flow. The basis for the large intercept is a great increase in the bilirubin concentration in bile as the flow is decreased. This results in a simultaneous sharp increase in the molar ratio (bilirubin/taurocholate) at very low rates. It is inferred, on the basis of the preceding data, that the capacity for bilirubin transport is linked to the secretion of bile acids into bile. At low rates of supply of bile acids, little of the material will reach the centers of the hepatic lobules and the contribution of bile acids to bile flow at the site will be relatively low. At higher rates of bile acid infusion or supply, increased amounts of the bile acids will reach the centers of the lobules and contribute to increased bile formation in these areas. It appears that this is the mechanism which underlies the change in the transport maximum for bilirubin with change in the rate of bile salt excretion.

6658 CHOLESTEROL ESTERIFICATION BY THE RAT LIVER GOLGI APPARATUS. *(E.)* Assmann, G.; Mahley, R. W.; Davis, B. D.; Holcombe, K. S. (Natl. Inst. Hlth., Bethesda, Md.). *Scand. J. Clin. Lab. Invest.* 33(Suppl. 137):23-28, 1974.

Livers of white Holtzmann rats of both sexes were fractionated into various subcellular components. Electron microscope examination showed numerous Golgi apparatus fragments together with large numbers of associated smooth-surfaced vesicular and saccular sections. The larger secretory vesicles contained particles previously identified as very low density lipoproteins (VLDL). Formation of cholesteryl esters in Golgi apparatus fractions was measured using a sonicated mixture of 2-[1-^{14}C oleoyl]-*sn*-phosphatidyl choline and 7-^{3}H-cholesterol as substrates. The isolated Golgi apparatus had significant fatty acyl coenzyme A-cholesteryl acyltransferase activity with an optimum at pH 5.8. When cholesterol esterification was investigated in other cell fractions with assay conditions optimized for the Golgi apparatus enzyme, the extent of esterification by any of the cell fractions was considerably smaller. The cholesteryl esters synthesized by the Golgi fraction enzyme could be specifically localized in the Golgi-VLDL particles. Whether the cholesteryl esters are core constituents of VLDL particles or merely associated with the particle surface constituents during their process of formation needs to be elucidated. The presence of fatty acyl coenzyme A-cholesteryl acyltransferase activity and its concentration in the hepatocyte Golgi apparatus support the concept that VLDLs are assembled in the peripheral elements of this particular cell fraction. The cholesterol-esterifying enzyme may help to maintain normal concentrations of both cholesterol and cholesteryl ester in the liver. The results emphasize the importance of the Golgi apparatus in the assembly of lipoproteins.

6659 BIOSYNTHESIS OF CHOLESTANOL: CONVERSION OF CHOLESTEROL INTO 4-CHOLESTEN-3-ONE BY RAT LIVER MICROSOMES.

(E.) Bjorkhem, I.; Karlmar, K. E. (Dept. Chem., Karolinska Inst., Stockholm, Sweden). *Biochem. Biophys. Acta* 337(1):129-131, 1974.

Low but significant conversion (0.29%) of cholesterol to 4-cholesten-3-one occurred when 0.14 μg of [1,2-^{3}H$_2$]cholesterol was incubated with the microsomal fraction of rat liver homogenate in the presence of nicotinamide adenine dinucleotide (NAD, 0.5-1.0 mM). No significant conversion occurred with the soluble fraction. In the presence of microsomes and NAD, the rate of conversion of cholesterol to 4-cholesten-3-one was almost linear with time; the extent of conversion under optimal conditions was 3-5 μg/g liver/hr. To rule out the possibility that the 4-cholesten-3-one formed from cholesterol was further metabolized to 5-α-cholestan-3-one and/or 5-α-cholestan-3β-ol, a trace amount of [1,2-^{3}H$_2$]cholesterol and 100 μg 4-cholesten-3-one did not affect the amount of 4-[1,2-^{3}H$_2$]cholesten-3-one obtained. Furthermore, incubation of 4-[4-^{14}C]cholesten-3-one with the NAD-fortified microsomal fraction did not produce significant conversion to products with the chromatographic properties of 5-α-cholestan-3-one or 5-α-cholestan-3β-ol. It is suggested that microsomal conversion of cholesterol to 4-cholesten-3-one is the rate-limiting step in the biosynthesis of cholestanol from cholesterol.

6660 THE INVOLVEMENT OF NICOTINAMIDE IN THE BIOSYNTHESIS OF NAD IN ISOLATED PERFUSED RAT LIVER.

(Ger.) Keller, J.; Liersch, M.; Grunicke, H. (Biochem. Inst., Univ. Freiburg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1371-1373, 1972.

To study the biosynthesis of NAD from nicotinamide, isolated rat livers were perfused with a hemoglobin-free medium containing a physiological concentration of nicotinamide (10 μM). Incorporation of nicotinamide into NAD occurred at about 40% of the rate found with a physiological concentration of nicotinic acid (5 μM). By using azaserine to block the nicotinic acid pathway, it was demonstrated that nicotinamide does not first undergo deamidation before it is incorporated into NAD. After injection of physiological concentrations of ^{14}C-nicotinamide, only a small percentage of the radioactivity appeared in the bile, ruling out the possibility that nicotinamide is excreted in the bile and undergoes deamidation in the intestine. After addition of ^{14}C-nicotinamide, no appreciable amounts of nicotinic acid nucleotides were detected, but nicotinic acid mononucleotide and particularly the adenine dinucleotide were found in large quantities when nicotinic acid was used as the precursor. These findings suggest that nicotinamide first reacts to form the nicotinamide mononucleotide which then undergoes an exchange reaction catalyzed by NAD-glycohydrolase. When the livers of fasted rats were perfused with an O$_2$-free medium in the absence of glucose, a significant decrease in the ATP level was accompanied by concommitant inhibition of NAD synthesis, indicating that biosynthesis of NAD from nicotinamide, as well as from nicotinic acid, is ATP-dependent. Under anoxic conditions, liberation of nicotinamide decreased, rather than increased, suggesting that NAD-glycohydrolase activity is not inhibited. Nicotinamide levels decreased to control values after a return to aerobic conditions, showing that the nicotinamide can be reutilized.

6661 HIGH BILIARY AND SYSTEMIC EXCRETION OF A GLUCURONIDE DURING ITS HEPATIC SYNTHESIS.

(E.) Gessner, T.; Hamada, N. (Cancer Drug Ctr., Roswell Park Mem. Inst., Buffalo, N.Y.). *Life Sci.* 15(1):83-94, 1974.

Two phases of biliary excretion of *p*-nitrophenyl-glucuronide were observed in isolated Sprague-Dawley rat livers perfused with ^{14}C-*p*-nitrophenol (5-20 μC). Excretion was fast when the rate of synthesis of the glucuronide was maximal, and this maximal rate was maintained by keeping substrate concentrations above 0.1 mM. Glucuronide excretion into bile was slower when the substrate concentration in the perfusate dropped below saturating levels (below 0.1 mM), even though the glucuronide concentration in the perfusate continued to rise during the synthetic period. The rate of biliary excretion remained slow and constant during the postsynthetic period after all detectable substrate had disappeared from the perfusate. Isotopic dilution experiments confirmed that newly synthesized glucuronide forms a hepatic pool of metabolite easily available for biliary excretion, but not readily diluted by the glucuronide in the circulation.

6662 RAT LIVER 3-HYDROXY-3-METHYLGLUTARYL COENZYME A REDUCTASE: A COMPARISON AND IMMUNOLOGICAL STUDY OF PURIFIED SOLUBILIZED PREPARATIONS, AND ALTERATIONS OF ENZYME LEVELS BY CHOLESTYRAMINE FEEDING. *(E.)* Higgins, M. J. P.; Brady, D.; Rudney, H. (Coll. Med., Univ. Cincinnati, Ohio). *Arch. Biochem. Biophys.* 163(1):271-282, 1974.

3-Hydroxy-3-methylglutaryl coenzyme A (HMG-CoA) reductase from Sprague-Dawley rat liver was solubilized with deoxycholate or 2 M salt. The deoxycholate-solubilized preparation was purified through hydroxylapatite chromatography and gel chromatography to the degree that only a single component was detected by polyacrylamide gel electrophoresis. The second preparation was purified to a high level by 2 passages through an agarose column: only 1 minor band was detectable above the main band. The deoxycholate-solubilized HMG-CoA reductase had a molecular weight of 197,000-202,000. Electrophoresis of both preparations treated with mercaptoethanol on polyacrylamide gels in the presence of sodium dodecyl sulfate revealed 1 band with a molecular weight of 65,000. The data are consistent with the trimeric structure consisting of 3 polypeptide chains of apparently identical molecular weight. HMG-CoA reductase solubilized by salt, freeze-thawing, or deoxycholate was tested for cross reactivity with an antibody prepared from the deoxycholate-solubilized preparation. Despite differences in specific activity, stability to cold, and salt requirement for preservation, the 3 preparations were immunologically indistinguishable. Administration of cholestyramine (2% of diet) to rats greatly stimulated the synthesis of enzyme protein without affecting decay rates. Comparison of ratios of enzymic activity to the amount of antigen-antibody precipitate showed that the enzyme from cholestyramine-treated animals ad a higher specific activity than that from untreatd rats. There were no immunologic differences beween the enzymes from both groups. The data indiate that changes in the state of the enzyme protein, s well as changes in the rate of protein synthesis, re important factors in the regulation of HGM-CoA eductase. Studies based only on enzyme specific acivity may fail to reveal significant changes in enyme protein concentrations.

663 INDUCTION OF ALKALINE PHOSPHATASE ACTIVITY BY DIBUTYRYL ADENOSINE 3':5'-CYCLIC MONOHOSPHATE IN ANEUPLOID RAT LIVER CELLS. *(E.)* Nose, .; Katsuta, H. (Inst. Med. Sci., Univ. Tokyo, Japan). *Exp. Cell Res.* 87(1):8-14, 1974.

lkaline phosphatase-I activity in cultured JTC-25-5 rat liver cells increased 10-fold when the cells ere incubated in the presence of dibutyryl cyclic MP (0.25 mM) and theophylline (1.0 mM). Alkaline hosphatase-II activity did not change significantly nder the same conditions, indicating that the 2 acivities are regulated by different mechanisms. Aong 6 subclones of this strain, alkaline phosphatase- activity was inducible in 4 with dibutyryl cyclic MP and theophylline. Extensive cytoplasmic elongaion was observed in inducible and uninducible sublones, and both types incorporated ^{3}H-dibutyryl cylic AMP to the same degree. Induction of alkaline phosphatase-I was inhibited by cycloheximide (1 μg/ml) but not by cytosine arabinoside (10^{-5} M) or colchine (10^{-7} M). More then 90% of alkaline phosphatase-I activity was recovered from the particulate subcellular fractions. Inhibition of alkaline phosphatase-I by cycloheximide suggests that *de novo* synthesis of protein is necessary for the induction.

6664 ENERGY REQUIREMENT FOR THE TRANSPORT OF REDUCING EQUIVALENTS FROM CYTOSOL TO MITOCHONDRIAE IN PERFUSED RAT LIVER. *(E.)* Krarup, N.; Olsen, C. (Inst. Physiol.; Univ. Aarhus, Denmark). *Life Sci.* 15(1):65-72, 1974.

The system transporting reducing equivalents across the mitochondrial membrane was investigated in perfused Wistar rat liver by following the flux of reducing equivalents from cytosol to mitochondria, estimated by ethanol elimination, and the redox potentials on both sides of the mitochondrial membrane, estimated from the lactate/pyruvate and β-hydroxybutyrate/acetoacetate ratios in the effluent medium. The power of the transport system was calculated to be 1.8×10^{-3} cal/min/g liver wet weight, which was about 1% of the metabolic rate. Uncoupling by 2,4 dinitrophenol increased the oxygen consumption 30%, but the ethanol elimination decreased despite a fall in the redox potential gradient. This resulted in a 50% decrease in power of the transport system. The data indicate that the transport of reducing equivalents from cytosol to mitochondria is energy dependent.

6665 LIPID METABOLISM IN SUCKLING RATS WITH FATTY LIVER INDUCED BY HYPOXIA. *(E.)* Chiodi, H.; Whitmore, S. (Dept. Ergonomics, Univ. California, Santa Barbara). *Experientia* 30(5):463-465, 1974.

Chronic hypoxia due to a simulated altitude of 4600 m induced hyperlipemia and fatty liver in suckling Sprague-Dawley rats maintained under hypoxic stress for 10-11 days, beginning at the age of 1 day. Total lipids in plasma and liver in chronically hypoxic animals were significantly greater than in 12-day-old controls. In the hypoxic rats, blood β-hydroxybutyrate and acetoacetate values were not significantly different from those of the controls. The β-hydroxybutyrate:acetoacetate ratio decreased by 21% in hypoxic animals. When rats were returned to sea level pressure for 8, 24, or 48 hr prior to sacrifice, the levels of total lipids in plasma and liver decreased significantly. In animals kept at sea level pressure for 24 hr, total liver lipids fell to normal values and β-hydroxybutyrate values increased significantly over those of rats sacrificed immediately after removal from the hypobaric chamber. The 3 animals which survived 48 hr outside the chamber had higher liver lipid levels and low β-hydroxybutyrate values compared with hypoxic rats kept 24 hr at sea level pressure before sacrifice. Apparently liver functions in the 3 rats were impaired to such a degree that recovery under the influence of normal oxygen pressure was no longer possible. The decrease in the β-hydroxybutyrate:acetoacetate ratio in hypoxic rats may have been due to low levels of hepatic glycogen in these animals. The increase in β-hydroxybutyrate blood levels in hypoxic rats returned to sea level for several hr prior to sacrifice could be due to the sudden removal of the depressant effect of hypoxia on lipid oxidation.

6666 STIMULATION OF HEPATIC DRUG-METABOLIZING ENZYMES BY DDT, POLYCYCLIC HYDROCARBONS OR PHENOBARBITAL IN ADRENALECTOMIZED OR CASTRATED MICE.

(E.) Chhabra, R. S.; Fouts, J. R. (Natl. Inst. Hlth., Res. Triangle Park, N.C.). *Toxicol. Appl. Pharmacol.* 28(3):465-476, 1974.

In rats benzpyrene treatment increases the hepatic microsomal aniline hydroxylase pH optimum from 7 to 8. No such shift was observed in male Swiss-Webster mice treated with benzpyrene (50 or 200 mg/kg/day i.p.) for 3 days. Further studies on hormonal regulation of ethylmorphine-*N*-demethylase, aniline, and benzpyrene hydroxylase in mice indicated that adrenalectomy, castration, or both together did not lower the basal activities of these enzymes in mice. In rats with similar operations, basal activities were reduced 50-90% depending on the enzyme. In mice without adrenals and/or testes, i.p. administration of DDT (200 mg/kg), benzpyrene (200 mg/kg), 3-methylcholanthrene (50 mg/kg), or phenobarbital (100 mg/kg) stimulated the drug-metabolizing enzymes to a somewhat higher extent than that observed in sham-operated controls. This contrasts with the effects of inducers on sham-operated *versus* adrenalectomized and/or castrated rats. These findings suggest that rats and mice differ in hormonal regulations of basal activities of hepatic microsomal-drug metabolizing enzymes and in the response of these enzymes to pretreatment of animals with inducers.

6667 THE ROLE OF METABOLISM IN CHLOROFORM HEPATOTOXICITY.

(E.) Lavigne, J. G.; Marchand, C. (Fac. Med., Univ. Montreal, Canada). *Toxicol. Appl. Pharmacol.* 29:312-326, 1974.

Pretreatment of male Sprague-Dawley rats with phenobarbital (50 mg/kg/day for 3 days, i.p.), 3-methylcholanthrene (40 mg/kg/day for 2 days, i.p.), or 3,4-benzpyrene (20 mg/kg/day for 2 days, i.p.) increased the toxicity of chloroform (0.5 ml/kg i.p.), as reflected by increased SGPT and a decrease in liver glucose-6-phosphatase activity. This enhancement of the toxicity of $CHCl_3$ was associated with an increase in $CHCl_3$ metabolism, as measured by pulmonary excretion of $^{14}CO_2$. An inhibitor of drug metabolizing enzymes, 2 diethylaminoethyl-2,2-diphenylvalerate hydrochloride (40 mg/kg i.p.), decreased pulmonary $^{14}CO_2$ excretion. Although these observations were compatible with the hypothesis that $CHCl_3$ acts through a metabolite, no metabolite could be detected by gas-liquid chromatography of blood or liver. In addition, there was no quantitative correlation between the increase in toxicity and the increase in $CHCl_3$ metabolism. Finally, 2 diethylaminoethyl-2,2-diphenylvalerate hydrochloride did not decrease $CHCl_3$ metabolism or result in a decrease in $CHCl_3$ liver concentration. Pretreatment with the inhibitor was associated with a significant increase in $CHCl_3$ concentration in all tissues except lungs and muscle 4 hr after injection of the halogenated hydrocarbon.

6668 THE INFLUENCE OF AGE, PHENOBARBITAL AND CARBONTETRACHLORIDE ON THE BROMSULPHTHALEINE BINDING TO CYTOSOL OF VARIOUS ORGANS AND ON THE BROMSULPHTHALEINE ELIMINATION FROM THE BLOOD.

(E.) Muller, D.; Klinger, W. (Inst. Pharmacol. Toxicol., Friedrich Schiller Univ., Jena, Germany). *Acta Biol. Med. Ger.* 32(2/3):211-218, 1974.

BSP (50 mg/kg) was administered i.p. to Wistar rats aged 3, 5, and 20 days and i.v. to rats aged 60 and 120 days. The *in vitro* binding of BSP to liver cytosol was very low in 3-day-old rats and increased continuously with increasing age. Phenobarbital (60 mg/kg i.p.) given for 3 days enhanced BSP binding to liver cytosol only in 20-day-old rats; no effect was observed on younger rats given phenobarbital directly or indirectly through their mothers' milk. Pretreatment for 6 days was required to enhance binding in older rats. A single injection of CCl_4 (1 ml/kg) diminished the BSP binding to liver cytosol of 20-day-old rats but had no effect on the other age groups. BSP binding to kidney, muscle, and brain cytosol was lower than the binding to liver cytosol and was not clearly influenced by age or phenobarbital treatment No BSP was detectable in muscle and brain cytosol after *in vivo* administration. BSP elimination from blood was more rapid in adult than in young animals; phenobarbital accelerated the elimination only in 20-day-old rats. The BSP concentrations in liver and kidney cytosol after *in vivo* administration appeared to reflect the changes in BSP serum level. It is suggested that BSP-binding proteins are not importan for the distribution volume of BSP or other organic anions.

6669 THE EFFECTS OF AZATHIOPRINE ON CCl_4 INDUCE CIRRHOSIS IN THE RAT.

(E.) Ranek, L.; Bremmelgaard, A.; Dupont, B.; Jorgensen, M.; Keiding S.; Thomsen, P.; Tyrsted, G. (Rigshosp., Copenhagen, Denmark). *Beitr. Pathol.* 152(1):66-73, 1974.

Azathioprine (6 mg/kg/day) was given p.o. for 6 mont to female Wistar rats. Half the rats also received CCl_4 (0.1 ml/100 g) injections twice weekly (i.m. du ing the first 3 months and s.c. during the last 3). Rats receiving CCl_4 alone or no treatment served as controls. Azathioprine augmented the CCl_4-induced mortality, with only 8 of 21 rats alive after 6 mont compared with 15 of 20 rats given CCl_4 alone. No deaths occurred in rats receiving azathioprine alone Liver histology was the same in rats receiving CCl_4 with and without azathioprine. Cirrhosis was presen in 5 survivors in the azathioprine-CCl_4 group and in 9 survivors in the CCl_4 group. Necroses tended to b more prominent in the former group, but inflammatory reactions were equally pronounced in both groups. I rats given azathioprine and CCl_4, liver weight, DNA content, and RNA synthesis were significantly increased, indicating an enhanced liver regeneration i surviving animals. Simultaneously, the hydroxyproli content was reduced, suggesting inhibition of fibroenesis. Azathioprine alone decreased liver RNA con- ent despite an increased synthesis rate, as measured incorporation of ^{32}P-orthophosphate into RNA. The ecreased fibrogenesis and enhanced regenerative ac- ivity in livers of surviving azathioprine-treated nimals provide some support for the clinical use of zathioprine in chronic active liver disease in man.

70 PREVENTION OF HALOTHANE INDUCED CHANGES IN RAT LIVER ENZYMES BY 3-AMINO-1,2,4-TRIAZOLE.

.) Langhans, W.; Schimassek, H. (Inst. Biochem. , Univ. Heidelberg, Germany). *Biochem. Pharmacol.* 3(2):403-409, 1974.

retreatment of male Wistar rats with 3-amino-1,2,4- riazole (85 mg/100 g i.p.) inhibited the increase n liver glycerol-3-phosphate oxidase activity induced halothane treatment (exposure to 1 vol% of a halo- hane-O_2 mixture for 1 hr daily for 14-17 days). The ame inhibitory effect of aminotriazole was found in drenalectomized rats, even though enzyme activity as increased 290% by halothane alone or by 560% com- ared with nonadrenalectomized control rats. The ffect of the halothane metabolite trifluoracetate 30 µM/100 g at normal water consumption for -17 days) on glycerol-3-phosphate oxidase was not ounteracted by aminotriazole. Trifluoroacetate in ombination with aminotriazole increased the enzyme ctivity by 280% in intact rats and by 340% in adre- alectomized rats. Aminotriazole also prevented the ncrease in the activity of malic enzyme, nicotanimide denine dinucleotide phosphate (NADPH)-oxidase, and DH produced by halothane treatment. The induction of lycerol-3-phosphate oxidase could not be counteracted actinomycin D because actinomycin itself increased he activity of this enzyme by 70%.

71 LIVER INJURY FOLLOWING HALOTHANE ANESTHESIA IN PHENOBARBITAL-PRETREATED RATS. *(E.)*

eynolds, E. S.; Moslen, M. T. (Peter Bent Brigham osp., Boston, Mass.). *Biochem. Pharmacol.* 23(2): 89-195, 1974.

inear foci of centrolobular necrosis on the posterior spect of the liver were consistently produced by 5 r of anesthesia with 0.85% halothane in young male harles River rats pretreated with phenobarbital (1 /liter drinking water) for 30 days. Microsomes solated from livers of these animals immediately fter completion of anesthesia had elevated lipid- onjugated diene contents, decreased cytochrome P- 50 contents, and decreased ^{14}C-glycine incorpora- ion into protein *in vivo*. The lipid-conjugated iene contents and ^{14}C-glycine incorporation, but ot the cytochrome P-450 contents, returned to pre- nesthesia levels within 2 hr. None of these altera- ions was evident in livers of saline-pretreated rats .23 g NaCl/liter drinking water) after halothane nesthesia. Apart from the persistence of decreased ytochrome P-450 levels in phenobarbital-pretreated nimals, alterations in lipid-conjugated diene and lycine incorporation did not occur after repeated nesthesia at 48-hr intervals, nor was hepatic ne- rosis as evident. However, anesthesia recovery imes increased significantly. These results indicate that halothane metabolites are directly hepatotoxic and that repeated anesthesia with halothane at 2-day intervals decreases its hepatotoxic effect, presumably by interfering with its metabolism to toxic metabolites by the endoplasmic reticulum. Similar morphologic lesions were produced in phenobarbital-pretreated animals by feeding minute doses of carbon tetrachloride as low as (4 mg/kg i.p.).

6672 SPECIES DIFFERENCES IN HEPATIC GLUTATHIONE DEPLETION, COVALENT BINDING AND HEPATIC NECROSIS AFTER ACETAMINOPHEN.

(E.) Davis, D. C.; Potter, W. Z.; Jollow, D. J.; Mitchell, J. R. (Natl. Heart Lung Inst., Bethesda, Md.). *Life Sci.* 14(11): 2099-2109, 1974.

Acetaminophen-induced hepatic necrosis was studied in Golden Syrian hamsters, General Purpose mice, Sprague-Dawley rats, guinea pigs, and rabbits given the analgesic (150-1500 mg/kg i.p.) 48 hr previously. Hamsters were susceptible to a single dose of 150 mg/kg with centrilobular necrosis appearing in 64% of animals. After administration of 400 mg/kg acetaminophen, necrosis was present in 100% of surviving hamsters (20% mortality) and the severity of necrosis was increased. A dose of 375 mg/kg acetaminophen induced hepatic necrosis in 46% of surviving mice (3%) mortality. As in hamsters, the incidence and severity of necrosis increased with higher doses (e.g., 99% showed necrosis after 750 mg/kg). Rats, guinea pigs, and rabbits were relatively resistant to hepatic injury even when the dose of acetaminophen was at or above the LD_{50} dose. Species susceptibility to hepatic injury was directly correlated with the extent of covalent binding of the presumed toxic metabolite of acetaminophen to hepatic microsomes. Binding was greater in hamsters and mice and markedly less in rabbits, guinea pigs, and rats. There was also a direct correlation between the severity of necrosis and the rate of hepatic glutathione depletion after acetaminophen. At 300 mg/kg, acetaminophen depleted hepatic glutathione 80% in hamsters and mice, but only 30% in guinea pigs and 10% in rats. The results support the hypothesis that the electrophilic arylating agent formed from acetaminophen *in vivo* is preferentially detoxified by conjugation with glutathione and that arylation of hepatic macromolecules occurs only when glutathione availability is exceeded. While the identity of the arylating metabolite is uncertain, an N-hydroxy derivative seems the most likely candidate.

6673 THE EFFECT OF ETHANOL ALONE AND COMBINED WITH DRUGS ON MICROSOMAL ENZYME ACTIVITY IN RAT LIVER.

(Ger.) Bode, C.; Bode, J. C.; Martini, G. (Med. Clin., Univ. Marburg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:909-910, 1973.

Five groups of 8-10 male Wistar rats each received a standard diet (20% protein) *ad libitum* plus (1) water; (2) a 15% ethanol solution (w/v) *ad libitum;* (3) 15% ethanol *ad libitum* + 5 g/kg/day ethanol p.o. through an esophageal tube; (4) water + 100 mg/kg/day phenobarbital; (5) water, 100 mg/kg/day phenobarbital, and 15% ethanol *ad libitum* + 5 g/kg/day p.o. Rats fed a low-protein (5%) diet received either water *ad libitum* (group 6) or 15% ethanol *ad libitum* + 5 g/kg/day p.o. (group 7). In groups (2) and (3) the activities of acetanilide hydroxylase and NADPH- and NADH-dependent cytochrome c reductase in the liver were decreased to 50% of control values, while the activities of 4ene-5-steroid reductase and glucose-6-phosphatase were increased by 150-200%. In group (4) no changes occurred in acetanilide hydroxylase or NADH-dependent cytochrome c reductase activities, while those of NADPH-dependent cytochrome c reductase, steroid reductase, and glucose-6-phosphatase increased significantly. In group (5) only glucose-6-phosphatase activity increased significantly; no changes occurred in the activities of the other enzymes. In group (6) the activities of acetanilide hydroxylase and NADPH- and NADH-dependent cytochrome c reductase decreased to about 20-30% of their initial values. Simultaneous administration of ethanol to protein-deficient rats (group 7) did not inhibit the activities of these enzymes further. Protein deficiency also reduced steroid reductase activity, while simultaneous administration of ethanol increased it significantly. Glucose-6-phosphatase activity was twice the control values in protein-deficient animals, but administration of alcohol had no effect on its activity. These findings indicate that ethanol has different effects on the various microsomal enzymes. Discrepancies found in drug metabolism in alcoholics may be attributed to ingestion of low-protein diets and sedatives and other drugs.

6674 EFFECT OF ACUTE AND CHRONIC ETHANOL TREATMENT ON HEPATIC TRIGLYCERIDE RELEASE FROM THE RAT PERFUSED LIVER.

(E.) Morland, J.; Oye, I. (Dept. Pharmacol., Univ. Oslo, Norway). *Eur. J. Pharmacol.* 27(2):238-244, 1974.

Male Wistar rats were fed ethanol (30% of total calorie intake) for 5 weeks (chronic ethanol treatment) or iscocaloric sucrose in place of ethanol (controls). Livers from both ethanol-treated and control rats were perfused with 0.18-0.25% ethanol (acute treatment) or without ethanol. Neither chronic nor acute ethanol treatment changed hepatic lipid levels. Chronic ethanol treatment resulted in a significant reduction in hepatic triglyceride and pre-β-lipoprotein release, while acute treatment increased the release of triglycerides and lipoproteins in ethanol-pretreated animals. Liver tryptophan oxygenase activity was significantly reduced by chronic ethanol treatment but not by acute treatment. Although liver protein content was reduced after ethanol perfusion, the decrease was less than reported for the perfused rabbit liver. No chronic or acute effect of ethanol was noted on bile production, BSP excretion in bile, or BSP disappearance from perfusate. The chronic effect of ethanol on triglyceride and lipoprotein release may be related to reduced protein synthesis in liver. The acute effect may be secondary to the established effect of ethanol on triglyceride synthesis or a direct effect on hepatic triglyceride release.

6675 HEPATIC MICROSOMAL ETHANOL-OXIDIZING SYSTEMS: SOLUBILIZATION, ISOLATION, AND CHARACTERIZATION.

(E.) Teschke, R.; Hasumura, Y.; Lieber, C. S. (VA Hosp., Bronx, N.Y.). *Arch. Biochem. Biophys.* 163(1):404-415, 1974.

The solubilization and subsequent separation of the hepatic microsomal ethanol-oxidizing system from alcohol dehydrogenase and catalase activities by DEAE-cellulose column chromatography is described. Absence of alcohol dehydrogenase in the column eluates exhibiting microsomal ethanol-oxidizing system activity was demonstrated by the failure of nicotinamide adenine dinucleotide to promote ethanol oxidation at pH 9.6. Differentiation of the microsomal ethanol-oxidizing system from alcohol dehydrogenase was further shown by the apparent K_m for ethanol (7.2 mM), insensitivity of the microsomal ethanol-oxidizing system to the alcohol dehydrogenase inhibitor pyrazole (0.1 mM), and by the failure of added alcohol dehydrogenase to increase the ethanol oxidation. Absence of catalatic activity in these fractions was demonstrated by spectrophotometric and polarographic assay. Differentiation of the microsomal ethanol-oxidizing system from the peroxidatic activity of the catalase was shown by the apparent K_m for oxygen (8.3 μM), insensitivity of the microsomal ethanol-oxidizing system to the catalase inhibitors azide and cyanide, and by the lack of a H_2O_2-generating system (glucose-glucose oxidase) to sustain ethanol oxidation in the eluates. The oxidation of ethanol to acetaldehyde by the alcohol dehydrogenase- and catalase-free fractions required reduced nicotinamide adenine dinucleotide phosphate (NADPH) and oxygen and was inhibited by CO. The column eluates showing microsomal ethanol-oxidizing system activity contained cytochrome *P*-450, NADPH-cytochrome *c* reductase, and phospholipids and also metabolized aminopyrine, benzphetamine, and aniline.

6676 AN EXPERIMENTAL MODEL FOR THE STUDY OF HEPATIC ENCEPHALOPATHY.

(E.) Norenberg, M. D.; Lapham, L. W.; Nichols, F. A.; May, A. G. (Univ. Rochester Med. Ctr., N.Y.). *Arch. Neurol.* 31(2):106-109, 1974.

A subacute experimental model of hepatic encephalopathy was created in 4- to 6-month-old Sprague-Dawley rats by constructing a portacaval shunt with subsequent feeding of a cationic ammonium exchange resin. The clinical course was characterized by fluctuating levels of consciousness, bizarre behavior, and motor symptoms leading to coma and death. Metabolic acidosis and dehydration were invariably present in the terminal stage. Serum ammonia levels, measured in 7 animals, were greatly elevated (mean, 1169.3 μg/deciliter). Serum glucose levels ranged from 155-364 mg/deciliter and pH values from 7.0 to 7.4. Sodium, potassium, and bilirubin levels remained normal. Histologic abnormalities included proliferation of Alz-

eimer type II astrocytes throughout all layers and
egions of the cerebral cortex. Calculations of as-
rocyte counts and nuclear volumes showed a signifi-
ant degree of hyperplasia and nuclear enlargement.
is model establishes the important role of ammonia
the production of encephalopathy and the associated
oduction of Alzheimer type II astrocytes.

77 THE ASTROCYTE RESPONSE IN EXPERIMENTAL POR-
TAL-SYSTEMIC ENCEPHALOPATHY: AN ELECTRON
CROSCOPIC STUDY. *(E.)* Norenberg, M. D.; Lapham,
W. (VA Hosp., Denver, Colo.). *J. Neuropathol.*
p. Neurol. 33(3):422-435, 1974.

patic encephalopathy was produced in Sprague-Dawley
ts by constructing a portacaval shunt followed by
vage feeding of an ammoniated cation exchange resin.
rum ammonia levels increased from a normal value of
0-285 μg/deciliter to 548-2154 μg/deciliter. Strik-
g behavioral changes occurred, leading to coma and
ath. The principal morphological alteration by
ght microscopy was hyperplasia of Alzheimer type II
trocytes in the cerebral cortex. The concomitant
trastructural change was increased numbers of cyto-
asmic organelles in the astrocytes, particularly in
tochondria and rough endoplasmic reticulum. Some
trocytes showed degenerative changes consisting of
attered cytoplasmic vacuoles, contracted mitochon-
ia, and a greater degree of electron-lucency of the
toplasm than is seen in brains of control animals.
is hypothesized that the proliferative and hyper-
ophic aspects of Alzheimer II astrocytosis reflect
heightened metabolic state associated with ammonia
toxification by the astrocytes. Critical metabolic
bstances are depleted during this abnormal state,
timately leading to the degenerative changes in as-
ocytes. Neuronal dysfunction in hepatic encephalo-
thy may be a direct effect of the increased serum
monia level or a result of the gliopathy induced by
e protracted elevated ammonia levels.

78 EFFECTS OF HAEMOPERFUSION THROUGH CHARCOAL
OR XAD-2 RESIN ON AN ANIMAL MODEL OF FULMI-
NT LIVER FAILURE. *(E.)* Weston, M. J.; Gazzard,
G.; Buxton, B. H.; Winch, J.; Machado, A. L.;
ax, H.; Williams, R. (King's Coll. Hosp. Med. Sch.,
ndon, England). *Gut* 15(6):482-486, 1974.

lminant liver failure was induced in 16 dogs by he-
tic artery ligation following a side-to-side anas-
omosis between the superior mesenteric vein and in-
rior vena cava. Hemoperfusion with activated char-
al was carried out for 10 hr in 5 animals, while 5
imals had a 6-hr hemoperfusion with XAD-2 resin.
e charcoal-hemoperfused animals had a significantly
nger mean survival time (17 hr) than did the 6 non-
rfused controls (9 1/2 hr). The resin-hemoperfused
imals also survived longer but the difference from
ntrols was not statistically significant. Charcoal
moperfusion prevented the progressive rise in blood
monia levels observed in controls and resin-hemo-
rfused animals. Resin hemoperfusion was associated
th a rapid fall in serum bilirubin, whereas there
s a progressive rise in serum bilirubin in charcoal-
moperfused and control rats. In the 2 resin-hemoperfused animals given ^{14}C-sodium glycocholate, sequential blood measurements showed its complete removal during a single passage across the perfusion column. Necropsy revealed extensive intraperitoneal hemorrhage due to thrombocytopenia in 4 of the 5 resin-hemoperfused animals. Platelet losses were much less severe during charcoal perfusion.

6679 INCREASED SERUM IMMUNOGLOBULIN LEVELS FOLLOWING PORTACAVAL SHUNT IN THE NORMAL RAT. *(E.)* Keraan, M.; Meyers, O. L.; Engelbrecht, G. H. C.; Hickman, R.; Saunders, S. J.; Terblanche, J. (Med. Sch., Cape Town, South Africa). *Gut* 15(6):468-472, 1974.

Serum protein changes, weight loss, and survival were compared in rats with an end-to-side portacaval shunt, normal rats, and sham-operated rats. Serum albumin and serum gamma globulin levels in the normal and sham-operated rats showed minimal variation over the 12-week study period. In the shunted rats, there was a progressive fall in serum albumin (from 4.7 to 3.9 g/100 ml) and a progressive increase in serum gamma globulin to a mean final value 4 times higher than the initial level. The serum albumin levels in shunted rats treated with neomycin (25 mg/day by gavage) did not change significantly and the serum gamma globulin levels had returned to preoperative levels by the 12th week. All sham-operated and normal animals survived longer than 20 weeks. Mean survival was 10-14 weeks in large (250-350 g) shunted animals and 29.2 days in small animals (150-250 g). Neomycin doubled the survival time of the small animals but had no effect on survival in large animals. While sham-operated animals gained 30% of preoperative weight, shunted animals lost 20% within 6 weeks and never regained postoperative levels. Neither weekly bleeding (0.5 ml) nor neomycin affected survival of sham-operated animals, but both factors reduced survival of shunted animals. The mean titer of antibacterial lipopolysaccharide antibody remained less than 20 in sham-operated animals, whereas shunted animals had a mean of 640 at the 6th week and a mean of 120 at the 12th week. The observed elevation of gamma globulin and reversals of albumin/globulin ratios in portacaval-shunted animals may represent an immune response to bacterial lipoploysaccharides released into the systemic circulation as a result of the shunt. The hyperglobulinemia of cirrhosis in human subjects may have a similar etiology.

6680 COMPARISON OF END TO SIDE AND SIDE TO SIDE PORTACAVAL SHUNTS IN DOGS AND HUMAN SUBJECTS WITH CIRRHOSIS AND PORTAL HYPERTENSION. *(E.)* Orloff, M. J.; Chandler, J. G.; Charters, III, A. C.; Condon, J. K.; Grambort, D. E.; Modafferi, T. R.; Levin, S. E. (Univ. Hosp., San Diego, Calif.). *Am. J. Surg.* 128(2):195-206, 1974.

End-to-side and side-to-side portacaval shunts were compared in dogs with liver disease, portal hypertension, and ascites and in human subjects with alcoholic cirrhosis. In animal experiments, ammonium tolerance and hepatic blood flow were almost identical in the 2 groups of shunts, whereas liver function and hepatic morphology were slightly but not significantly better after the lateral anastomosis. In 20 human subjects, blood ammonia response to gavage of ammonium citrate and gavage of whole bank blood was similar in patients with end-to-side shunts (10) and side-to-side shunts (10). Long-term studies were performed on 60 selected cirrhotic patients who had elective shunt surgery (25 end-to-side and 35 side-to-side) and on 112 unselected patients who underwent emergency shunt operations (25 end-to-side and 87 side-to-side). There were no significant differences between the 2 types of shunts with regard to incidence and severity of hepatic encephalopathy, long-term survival, and effect on hepatic function after elective or emergency procedures. All of the side-to-side and 96% of the end-to-side shunts remained patent during the 2- to 8-yr observation period. The reduction in splanchnic portal pressure was similar after the 2 types of bypass, and the 2 anastomoses were equally effective in preventing further variceal bleeding. The results indicate that one shunt does not have a clear advantage over the other under conditions other than spontaneous reversal of portal blood flow. To prevent development of fatal ascites, a side-to-side shunt should be mandatory in patients with retrograde flow in the portal vein.

6681 EFFECT OF FREE FATTY ACIDS ON HEPATIC ADENINE NUCLEOTIDE CONTENT AND OXIDATIVE METABOLISM. *(E.)* Mannaerts, G.; Debeer, L. J.; De Schepper, P. J. (Lab. Pharmacol., Catholic Univ., Louvain, Belgium). *Arch. Int. Physiol. Biochim.* 82 (2):357-358, 1974.

6682 EFFECT OF STORAGE ON MICROSOMAL MIXED FUNCTION OXIDASE ACTIVITY IN MOUSE LIVER. *(E.)* Litterst, C. L.; Mimnaugh, E. G.; Reagan, R. L.; Gram, T. E. (Natl. Cancer Inst., Natl. Inst. Hlth., Bethesda, Md.). *Biochem. Pharmacol.* 23(17): 2391-2394, 1974.

6683 AN ATTEMPT TO PRODUCE CHOLEDOCHAL CYST IN PUPPIES. *(E.)* Kato, T.; Asakura, Y.; Kassai, M. (Tohoku Univ. Sch. Med., Sendai, Japan). *J. Pediatr. Surg.* 9(4):509-513, 1974.

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See also, 6522, 6526, 6563, 6771, 6776, 6788, 7162, 7183.

SECRETION AND METABOLISM

Intestine

'33 DISACCHARIDASE ACTIVITIES IN THE RAT INTESTINE. II. EFFECT OF PROGESTERONE. *.)* Goldstein, R.; Landau, H.; Freier, S. (Shaare dek Hosp., Jerusalem, Israel). *Am. J. Clin. Nutr.* '(8):845-849, 1974.

e effect of progesterone, administered by differ- t routes, on disaccharidase activities in the all intestine was studied in Sabra rats of various es. Lactase and maltase activities in weanling ts were significantly higher 24 hr after s.c. or p. injection of 2-6 mg/100 g progesterone than af- r s.c. or i.p. injection of 2-6 mg/100 g ethyl ol- te. The effect of progesterone on sucrase was ss pronounced. P.o. doses of 4-9 mg/100 g had no gnificant effect on disaccharidase levels. In ckling rats, s.c. administration of 3-10 mg/100 g ogesterone had no effect on sucrase activity and used only a borderline rise in 24- and 48-hr lac- se and maltase activities. Two-month-old rats on at milk diets showed a significant rise in lactase tivity 24 hr after the last of 5 s.c. ethyl oleate jections (3 mg/100 g on alternate days). The ef- ct of progesterone, at the same rate and route, on ctase activity was even greater at 24 and 48 hr. 74 hr, there were no differences between untreated ts on a normal diet and rats treated with proges- erone or ethyl oleate. The s.c. route appeared the fest as mortality was lower without loss of effi- iency. However, 6 mg/100 g progesterone was lethal the majority of weanling rats (5 of 8) whether ministered i.p. or s.c. Suckling rats tolerated mg/100 g s.c. The results show that the effect progesterone on disaccharidase activity is age- ependent and short-lived. Only in adult rats, when ogesterone worked synergistically with goat milk, d the effect last 48 hr. The steroid may have ac- ivated adult cells to produce more enzymes.

734 EFFECT OF 200, 650 AND 1200 R ON THE INTESTINAL DISACCHARASES AND DIPEPTIDASES. *.)* Becciolini, A.; Cariaggi, P.; Arganini, L.; astagnoli, P.; De Giuli, G. (Univ. Florence Med. ch., Italy). *Acta Radiol.* [*Ther.*] *(Stockh.)* 13(2): 41-152, 1974.

emale Sprague-Dawley rats were irradiated in the dominal area with 200 r (21 rats), 650 r (21 rats) 1200 r (39 rats) and sacrificed at 3 hr to 16 days fter irradiation to study postirradiation changes in isaccharase and dipeptidase activities. A 3-phase equence was observed for all doses applied. Enzyme ctivities were higher than controls in the initial hase in all animals killed at 4 and 24 hr after irradiation. This was followed by the intermediate phase at 48 to 72 hr in which enzyme activities as well as total protein content were reduced. In the final phase, appearing after 5 days, all parameters returned to control values. At 1200 r, an initial phase of great enzyme increase occurred. In the intermediary phase there was nearly complete disappearance of maltase and invertin. A residual activity of lactase and leucine aminopeptidase still persisted. There was great variability among animals receiving 1200 r, due to the severity of the gastrointestinal reaction. Moreover, the return to normal values (11-16 days) was not uniform along the length of the intestine. These results indicate that in an animal given a single irradiation to the abdomen, the morphologic alterations in the small intestine are associated with changes in enzyme activities which are both time and dose dependent. The increase in enzyme activities in the initial phase indicates that lesions occur at the level of enzyme synthesis or at the sites where these enzymes are probably stored in an inactive form, waiting to be transferred in the brush border. This could mean the activation of enzymes or the inactivation of inhibitors.

6735 GLYCOPROTEIN SYNTHESIS AND SECRETION BY MUCOSAL BIOPSIES OF RABBIT COLON AND HUMAN RECTUM. *(E.)* MacDermott, R. P.; Donaldson, R. M.; Trier, J. S. (Boston Univ. Sch. Med., Mass.). *J. Clin. Invest.* 54(3):545-554, 1974.

When maintained in organ culture, mucosal biopsies from rabbit colon and human rectum incorporated ^{14}C-leucine into proteins and ^{14}C-glucosamine into glycoproteins at a steady rate for 24 hr. This incorporation probably represents macromolecular synthesis rather than nonspecific attachment of radioactive precursors since incorporation was almost completely prevented by cycloheximide (1 mg/ml). Glucosamine was predominantly incorporated into macromolecules that were ultimately secreted into the incubation medium, while leucine was predominantly incorporated into tissue macromolecules. When studied by autoradiography, cultured rabbit colonic biopsies synthesized and secreted glycoproteins *in vitro* at cellular sites and over a time course observed in previous *in vivo* studies. The interval between exposure of intestinal mucosa to labeled glucosamine and initial secretion of labeled glycoproteins was 3-4 hr. Acetylcholine (10^{-8} to 10^{-6} M) consistently stimulated secretion of labeled glycoproteins but did not alter glycoprotein synthesis. In contrast, cycloheximide had no effect on secretion although it impaired protein synthesis. Rectal biopsies from patients with active ulcerative colitis incorporated increased amounts of ^{14}C-glucosamine into glycoproteins during organ culture and secreted labeled glycoproteins more rapidly than did biopsies from normal subjects. The elution pattern of dialyzed media fractionated by 2B gel filtration suggested an increase in the proportion of high molecular weight glycoproteins in ulcerative colitis biopsies. Presumably, these glycoproteins represented mucus. No new peaks were observed, indicating the composition of rectal mucus is similar in normal subjects and patients with ulcerative colitis.

6736 VASOACTIVE INTESTINAL PEPTIDE STIMULATION OF ADENYLATE CYCLASE AND ACTIVE ELECTROLYTE SECRETION IN INTESTINAL MUCOSA. *(E.)* Schwartz, C. J.; Kimberg, D. V.; Sheerin, H. E.; Field, M.; Said, S. I. (Harvard Med. Sch., Boston, Mass.). *J. Clin. Invest.* 54(3):536-544, 1974.

The effect of vasoactive intestinal peptide (VIP) on cyclic AMP levels, adenylate cyclase activity, and ion transport was tested on *in vitro* preparations of ileal mucosa. At concentrations of 20 μg/ml and 2 μg/ml, resp., VIP caused a 5-fold increase in cyclic AMP in rabbit and human ileal mucosa. In rabbit ileal mucosa, the effect of VIP on cyclic AMP was apparent at 0.1 μg/ml and was maximal at 2.0 μg/ml. Pentagastrin and glucagon (alone or in combination), secretin, carbachol, gastric inhibitory peptide, serotonin, bradykinin, and vasopressin did not increase cyclic AMP levels in rabbit mucosa. Pentagastrin and glucagon also failed to increase the level of the nucleotide in canine ileal mucosa. VIP (100 μg/ml), but not serotonin (6.0×10^{-5} M), stimulated adenylate cyclase activity in a membrane preparation from rabbit ileal mucosa. When added to the serosal side of isolated rabbit ileal mucosa clamped in an Ussing chamber, VIP (2 μg/ml) increased short-circuit current and caused net secretion of both Cl^- and Na^+; net Cl^- excretion exceeded net Na^+ secretion. Addition of VIP (2 μg/ml) to the serosal bathing solution of human ileal mucosa increased short-circuit current to the same extent as that caused by 5 mM theophylline. When added to the luminal bathing solution, VIP did not increase short-circuit current. The effects of VIP on mucosal cyclic AMP metabolism and ion transport are similar to those observed with cholera enterotoxin and certain prostaglandins. Diarrhea in patients with VIP-bearing tumors may be due to interaction between VIP and adenylate cyclase in the small intestine mucosa.

6737 ADENYLATE CYCLASE ACTIVITIES AND ADENOSINE 3':5'-CYCLIC MONOPHOSPHATE CONCENTRATIONS IN VILLUS AND CRYPT CELLS OF RAT SMALL-INTESTINAL EPITHELIUM: RESPONSE TO CHOLERA TOXIN, PROSTAGLANDIN E$_1$ AND HORMONES. *(E.)* De Jonge, H. R.; Hulsmann, W. C. (Dept. Biochem., Erasmus Univ., Rotterdam, Netherlands). *Biochem. Soc. Transact.* 2(3):416-419, 1974.

In order to study long-term effects of cholera toxin and hormones on intestinal cells, adenylate cyclase activities were measured in freshly isolated villus and crypt cells from treated and control rats. Basal and NaF (10mM)-stimulated values did not vary appreciably from duodenum to ileum. Both villus-cell and crypt-cell adenylate cyclase activity increased rapidly in response to prostaglandin E$_1$ (20 μM) and relatively high concentrations of epinephrine (20 μM). The villus-cell:crypt-cell ratio of enzyme activity/mg of protein in the fluoride-stimulated state varied between 0.7 and 0.9, indicating the enzyme activity was almost the same in upper villus and crypt cells. Since only mature villus cells have a well developed brush border, this finding argues strongly against a localization of adenylate cyclase in the brush-border region and agrees with the results of studies performed on rabbit small intestine which indicate that the enzyme occurs preferentially in basal and lateral plasma membranes. Insulin (1-100 ng/ml) and cholera toxin (1-10 μg/ml) did not influence the basal activity of adenylate cyclase to a significant extent during the 15-60 min incubation procedure.

6738 ETHANOL-INDUCED INHIBITION OF HUMAN INTESTINAL ENZYME ACTIVITIES: REVERSAL BY FOLIC ACID. *(E.)* Greene, H. L.; Stifel, F. B.; Herman, R. H.; Herman, Y. F.; Rosensweiz, N. S. (Fitzsimons Army Med. Ctr., Denver, Colo.). *Gastroenterology* 67(3):434-440, 1974.

The effects of ethyl alcohol on intestinal glycolytic enzymes and fructose diphosphatase were studied in 10 normal subjects on a constant synthetic diet containing 100 μg folic acid/day or on an *ad libitum* mixed diet. During the constant diet, ethanol (15 ml 4 times/day for 7 days) caused a 36-45% decrease in the activities of hexokinase, fructose-1-phosphate aldolase, and fructose-1,6-diphosphate aldolase; a 58% decrease in the activity of fructose-1,6-diphosphatase; and a 33% increase in the activity of pyruvate kinase. Folic acid (5 mg 3 times/day) given with ethanol for 7 days prevented the decrease in enzyme activities produced by ethanol alone: there was a small but significant increase in all the enzymes except fructose diphosphatase. Pyruvate kinase activity increased 2.8-fold when both ethanol and folate were given. After 7 days, folic acid alone caused a 1.6- to 2-fold increase in all the enzymes. Mean folate levels in plasma and RBC increased from 1.7 and 116 ng/ml, resp., at the beginning of the study to 34.3 and 196 ng/ml, resp., after folate treatment. Thus, ethanol did not interfere with folic acid absorption or incorporation into RBC. With the *ad libitum* mixed diet, changes in enzyme activities with ethanol and folate were qualitatively similar to those seen during the constant synthetic diet. A dose of glucose with the same number of calories as that provided by the alcohol did not cause the changes seen with ethanol. Therefore, the action of ethanol is not due to its caloric value. If the deleterious effects of ethanol are related to prolonged decreases in various enzyme activities, folic acid may exert a protective action.

6739 THE EFFECT OF CHRONIC UREMIA ON INTESTINAL MITOCHONDRIAL ACTIVITY. *(E.)* Russell, J. E.; Avioli, L. V. (Jewish Hosp., St. Louis, Mo.). *J. Lab. Clin. Med.* 84(3):317-326, 1974.

tochondria were isolated from the duodenal mucosa
female Holtzman rats with experimentally induced
emia of 5 weeks duration, and their ability to
cumulate and release ^{45}Ca and inorganic phosphate
i) was determined. Rats were made uremic by uni-
teral nephrectomy with segmental infarction of
e remaining kidney. When compared to pair-fed
ntrol animals, ^{45}Ca uptake and release were signi-
cantly impaired in the intestinal mitochondria of
emic animals whereas Pi release was unaltered.
ese changes were associated with a decrease in the
spiratory control ratio of intestinal mitochondria
uremic animals and significant decrements in both
ate 3 and State 4 respiration. These data are
nsistent with the hypothesis that chronic uremia
ads to a decrease in electron transport as well as
oxidative phosphorylation of intestinal mito-
ondria.

40 NATURALLY OCCURRING INTESTINAL MALABSORPTION IN THE DOG. *(E.)* Hill, F. W. G.;
lly, D. F. (Med. Sch., Univ. Bristol., England).
. *J. Dig. Dis.* 19(7):649-665, 1974.

study was made of 8 dogs with malabsorption asso-
ated with disease of the small intestine. Clin-
al features included the fact that onset of the
ndrome often followed a systemic illness in which
thargy and signs of acute enteric or gastroenteric
sturbance had occurred. Loss of weight, increased
petite, profuse and often watery and blood-stained
arrhea marked all case histories. Every dog had
w serum cholesterol, 4 had raised plasma GPT le-
ls and 3 had elevated plasma alkaline phosphatase.
eatorrhea was a constant finding, fat assimilation
nging between 73 and 89%. Mucosal disaccharidase
tivity was low, particularly maltase levels. In-
eased excretion in the ^{131}-polyvinylpyrrolidone
st indicated an increased permeability of the in-
stinal mucosa to large molecules and implied that
e hypoproteinemia resulted from protein-losing en-
ropathy. These observations suggest that clinical
labsorption was associated with disease of the
all intestine. Management of the malabsorption in-
lved use of a low-residue glucose and protein diet,
th administration of intestinal astringents, broad-
ectrum antibiotics, and corticosteroids to control
arrhea and suppress inflammatory reaction in the
wel. Response was not good. Morphologic designa-
ons included lymphangiectasea, inflammatory disease
the bowel, neoplastic disease of the bowel, and
llous atrophy. Villous atrophy was sometimes the
le abnormality and sometimes occurred in combina-
on with other intestinal lesions.

41 TWO PATTERNS OF NEUTRAL STEROID CONVERSION IN THE FECES OF NORMAL NORTH AMERICANS.
.*)* Wilkins, T. D.; Hackman, A. S. (Anaerobe Lab.,
rginia Polytechnic Inst. State Univ., Blacksburg).
ncer Res. 34:2250-2254, 1974.

cal neutral steroids from 31 normal male and female
rth Americans eating a normal high meat diet were
alyzed by gas-liquid chromatography. Patterns of
cal neutral steroid conversion fell into two distinct groups. One group (23 subjects) was characterized by extensive conversion of cholesterol and two plant steroids, sitosterol and campesterol, to coprostanol and coprostanone. The second group (8 subjects) showed little or no conversion. Comparison of total mean levels for cholesterol and its conversion products showed no difference between the high and low-conversion groups. These conversion patterns were stable over long periods. If the extent of conversion of neutral steroids is associated with large-bowel carcinogenesis, as has been previously reported, then these two groups may be at different levels of risk.

6742 INHIBITION OF Na^+-K^+-DEPENDENT ATP-ase FROM MUCOSA OF HUMAN SMALL INTESTINE BY BUTYL-BIGUANIDE. *(E.)* Bero, T.; Petz, A.; Kutas, J.; Mozsik, G. (Univ. Med. Sch., Pecs, Hungary). *Pharmacology* 11(4):247-252, 1974.

6743 TEMPERATURE AND ION DEPENDENCES OF INTESTINAL SMOOTH MUSCLE MYOSIN B. *(E.)* Matsumoto, H.; Yabu, H.; Miyazaki, E. (Sapporo Med. Coll., Japan). *Jap. J. Physiol.* 24(2):167-176, 1974.

6744 DEPRESSION OF LACTASE ACTIVITY IN THE SMALL INTESTINE OF INFANT RABBITS BY Candida albicans. *(E.)* Bishop, R. F.; Barnes, G. L. (Roy. Child. Hosp., Melbourne, Australia). *J. Med. Microbiol.* 7(2):259-263, 1974.

6745 BIOSYNTHESIS OF MEMBRANE GLYCOPROTEINS IN THE RAT SMALL INTESTINE. *(E.)* Kim, Y. S.; Perdomo, J. M. (VA Hosp., San Francisco, Calif.). *FEBS Lett.* 44(3):309-313, 1974.

6746 INDOMETHACIN INHIBITION OF Salmonella typhimurium, Shigella flexneri, AND CHOLERA-MEDIATED RABBIT ILEAL SECRETION. Formal, S. B.; Giannella, R. A. (Walter Reed Army Inst. Res., Med. Div., Washington, D.C.). *J. Infect. Dis.* 130(3):280-283, 1974.

6747 RESPONSE OF THE RABBIT ILEAL LOOP TO FOUR SEROTYPES OF ENTEROPATHOGENIC Escherichia coli. *(E.)* Staley, T. E.; Norris, H. T.; Smith-Staley, J. A. (Univ. Washington Sch. Med., Seattle). *Am. J. Vet. Res.* 35(9):1235-1240, 1974.

6748 CHOLESTEROL SYNTHESIS IN RAT INTESTINE: EFFECT OF FASTING AND OF PORPHYROGENIC CHEMICAL ALLYLISOPROPYLACETAMIDE. *(E.)* Sanghvi, A.; Wight, C.; Balachandran, R.; Frantz, Jr., I.; Ener, M.; Taddeini, L. (Dept. Pathol., Univ. Pittsburgh, Pa.). *Life Science* 14(9):1679-1686, 1974.

6749 SOME PATTERNS IN DISORDERS OF ENERGY METABOLISM DURING ACUTE ISCHEMIA ACCOMPANYING SMALL INTESTINE TRANSPLANTATION. *(Rus.)* Saburova, L. M.; Mosin, N. I.; Bukov, V. A. (Lab. Organ Tissue Transplantation, P. Lumumba Peoples Friendship Univ., Moscow, USSR). *Biull. Eksp. Biol. Med.* 77 (5):47-49, 1974.

6750 STUDY OF THE SURVIVAL OF INTESTINAL MUCOSA FROM THREE SPECIES OF MAMMALS IN ORGANOTYPIC CULTURES. *(Fr.)* Haffen, K.; Kedinger, M.; Grenier, J. F. (Res. Unit 61, INSERM, Strasbourg/Hautepierre, France). *C. R. Soc. Biol. (Paris)* 167(12):1973-1977, 1974.

6751 RADIATION PATHOLOGY OF MEMBRANE-BOUND DIGESTION. *(Ger.)* Gavrilov, R. I. (Central Sci. Res. Inst. Roentgenol. Radiol., Leningrad, USSR). *Wissenschaftl. Z. Karl Marx Univ. [Math. Naturwissenschaftl. Reihe]* 23(1):45-47, 1974.

6752 ENZYME SECRETING ACTIVITY OF THE SMALL INTESTINE WHEN ITS SECRETION IS STIMULATED. *(Rus.)* Glushko, L. F.; Pulatov, A. S. (Andizhan Med. Inst., USSR). *Vopr. Pitan.* (3):41-44, 1974.

6753 INTESTINAL ENZYMES IN NEONATES IN HEALTH AND DISEASE. *(Rus.)* Zakirova, R. A.; (S. V. Kurashova Med. Inst., Kazan, USSR). *Pediatriia* (11):57-58, 1973.

6754 SMALL INTESTINE ENZYMES IN NORMAL YOUNG CHILDREN. *(Ukr.)* Bil's'ka, L. H. (Kiev Inst. Postgrad. Med., USSR). *Pediatr. Akush. Ginekol.* 36(2):29-30, 1974.

See also, 6541, 6542, 6543, 6544, 6546, 6547, 6557, 6561, 6564, 6623, 6975, 7023.

GENERAL

6755 IN VITRO ADSORPTION OF BILE SALTS TO FOOD RESIDUES, SALICYLAZOSULFAPYRIDINE, AND HEMICELLULOSE. *(E.)* Birkner, H. J.; Kern, F. (Univ. Colorado Med. Ctr., Denver). *Gastroenterology* 67(2):237-244, 1974.

In vitro adsorption of ^{14}C-labeled cholate, chenodeoxycholate, deoxycholate, and taurocholate, as well as ^{3}H-labeled (glycine) glycocholate, to nondigestible food residues, hemicellulose, salicylazosulfapyridine, and cholestyramine was studied. The radioactive bile salts were incubated with food residues and drugs in buffered solutions; following centrifugation, adsorption was estimated from the decrease in radioactivity in the supernatant solution. Certain food residues, especially celery, corn, lettuce, potato, and string beans, adsorbed large amounts of bile salts, especially unconjugated dihydroxy bile salts. A linear relation between the reciprocals of bile salt adsorption and bile salt concentration suggest that adsorption of bile salts to food residues is a uniform and monomolecular process. The amounts adsorbed were 20-60% of that absorbed by cholestyramine which was used as a comparison. Extrapolation to whole foods indicate that modest amounts (173-389 g) of whole kidney bean, potato, string bean, or corn in the diet can adsorb 1 g of chenodeoxycholate at physiological pH and concentration. Bile salt adsorption to food residues was increased at lower pH values and was greater for less polar bile salts, suggesting that the adsorptive process was hydrophobic in nature. Hemicellulose and salicylazosulfapyridine adsorbed only small amounts of bile salts. Bile salt adsorption to food residues might be an important determinant of stool mass and water content in normal man and might also play an important role in fat absorption and bowel function in patients with decreased intestinal bile salt concentration, especially after bacterial deconjugation and dehydroxylation of the bile salts.

6756 SYNTHESIS OF THE VASOACTIVE INTESTINAL PEPTIDE (VIP). *(E.)* Bodanszky, M.; Klausner, Y. S.; Lin, C. Y.; Mutt, V.; Said, S. I. (Dept. Chem. Case Western Reserve Univ., Cleveland, Ohio). *J. Am. Chem. Soc.* 96(15):4973-4978, 1974.

An octacosapeptide with the amino acid sequence proposed for vasoactive intestinal peptide (VIP) was synthesized in solution through isolated intermediates. The protected heptapeptide derivative, *tert*-butyloxy-carbonyl-L-threonyl-L-aspartyl-L-asparaginyl L-tyrosyl-L-threonyl-L-arginyl-L-leucine azide, was coupled to the partially deprotected pentadecapeptide L-arginyl-*N*-benzyloxycarbonyl-L-lysyl-L-glutaminyl-L-methionyl-L-alanyl-L-valyl-*N*-benzyloxycarbonyl-L-lysyl-*N*-benzyloxycarbonyl-L-lysyl-L-tyrosyl-L-leucyl-L-asparaginyl-L-seryl-L-isoleucyl-L-leucyl-L-asparaginamide (hydrochloride). The resulting protected docosapeptide was partially deprotected and acylated with *tert*-butyloxycarbonyl-L-histidyl-L-seryl-L-aspartyl-L-alanyl-L-valyl-L-phenylalanine azide to afford a protected octacosapeptide encompassing the entire sequence of VIP. The protecting groups were removed in a single operation with trifluoroacetic acid. The product was compared with natural (porcine) VIP after purification by countercurrent distribution; the synthetic peptide showed the characteristic biological activities of the natural material in systemic vasodilation and reduction of arterial blood pressure in intact dogs and relaxation of several isolated smooth muscle preparations. Comparisons of the fragments forme in side-by-side degradations of samples of natural and synthetic VIP with specific enzymes support the amino acid sequence proposed for porcine VIP.

6757 EFFECT OF IRRADIATION OF GASTROINTESTINAL DRUG ABSORPTION IN MICE AND RATS. *(E.)*

rwitz, A.; Doull, J. (Univ. Kansas Med. Ctr., Kansas ty). *Radiat. Res.* 59:606-613, 1974.

udies were conducted to determine the effects of blethal doses of x-irradiation on passive gastro- testinal absorption of sulfadiazine, an acidic ug, and of quinine, a basic drug, in adult male iss Webster mice and Sprague-Dawley rats. Whole dy x-irradiation of mice with 600 r decreased gas- ic absorption of both drugs within 2 hr. The ximal effect was seen at 24 hr after irradiation, th inhibition lasting for 5 to 6 days. Similar fects were observed in rats receiving 400 or 800 Irradiated mice receiving sulfadiazine by i.p. jection and irradiated rats receiving the drug by odenal intubation were able to absorb sulfadiazine readily as controls. Rats receiving 600 r to the dy or to the head only absorbed sulfadiazine more adily than rats receiving whole body irradiation, t absorbed the drug less readily than controls. ug levels in rats receiving only head irradiation, ich is known to delay gastric emptying, approached ose in nonirradiated controls after 60 min. Thus, appears that delayed gastric emptying is the most portant factor inhibiting gastrointestinal absorp- on after x-irradiation of rats and mice.

58 QUANTITATIVE MEASUREMENT OF GASTROINTESTINAL BLEEDING IN RATS: THE EFFECT OF NONSTEROIDAL TI-INFLAMMATORY DRUGS. *(E.)* Menassé-Gdynia, R.; rupp, P. (Ciba-Geigy Ltd., Basel, Switzerland). *xicol. Appl. Pharmacol.* 29(3):389-396, 1974.

e effect of various nonsteroidal anti-inflammatory ugs on gastrointestinal bleeding was studied in le inbred Fischer rats using ^{51}Cr-labeled RBC. All ugs inhibited kaolin-induced paw edema at concen- ations tested. Indomethacin (5 mg/kg), acetylsali- lic acid (240 mg/kg), diclofenac sodium (17 mg/kg), enylbutazone (113 mg/kg) and sodium salicylate 90 mg/kg) all led to loss of large amounts of ood into feces within 24 hr. Bleeding generally sted for 3 days following a single dose of the ti-inflammatory agents. Indomethacin was the most rmful agent, causing pronounced bleeding in doses ove 10 mg/kg. With the exception of oxyphenbut- zone, these agents caused a dose-related RBC loss in e feces. While the dose of diclofenac sodium caus- g gastrointestinal bleeding was about 14 times the erapeutic dose, indomethacin and acetylsalicylic cid produced gastrointestinal bleeding at doses close therapeutically active levels. These results emonstrate that the gastric irritant activity of ti-inflammatory agents is not strictly correlated ith their anti-inflammatory activity.

'59 EFFECT OF BIOISOLATION AND THE INTESTINAL FLORA OF MICE UPON EVALUATION OF AN APOLLO IET. *(E.)* Luckey, T. D.; Bengson, M. H.; Kaplan, . (Univ. Missouri Sch. Med., Columbia). *Aerosp. Med.* 5(5):509-518, 1974.

typical Apollo diet, which previously had been ound to be marginal by chemical analysis but adequate or classic mice (weanling CRL-CD-1 Swiss) before and after sterilization, was fed to gnotobiotic mice (weanling CRL-CD-1 Swiss) to determine the effect of different microorganisms on the utilization of a marginal diet. Although the low-iron diet was found to be adequate for classic mice through 3 generations, very few of the gnotobiotic mice reproduced and none reared their young to weaning. The different states of gnotobiotic mice utilized for evaluation of Apollo diet were: germfree and mono- and diassociated mice carrying *Escherichia coli*, *Lactobacillus leichmannii*, *Candida albicans*, *Staphlococcus epidermidis*, and *Bacteroides sp.* The best of the gnotobiotic states for this marginal diet was that in which mice were monoassociated with *S. epidermidis*. For most factors studied, these mice were as good as classic mice; but since they did not reproduce, other problems must have been involved. The mice monoassociated with *E. coli* had a good appearance but very poor survival; presumably, synthesis of enterobactin by *E. coli* depleted the enteric milieu of available iron. Survival was particularly poor in mice which were weak at weaning and which were di-associated with *E. coli* and either *L. leichmannii* or *C. albicans*. The greatest mortality occurred in the 3rd generation of classic mice in bioisolation. Here, a sudden death occurred precipitously and only 20% of the mice survived after 5 weeks. In conditions such as radiation treatment for cancer or treatment with immunosuppressive therapy, humans harboring potentially hazardous microflora are placed in strict bioisolation. The results suggest that these patients should have a positive means for microflora control, including possible oral inoculations with vitamin-synthesizing organisms.

6760 AN INHIBITORY INNERVATION AT THE GASTRODUODENAL JUNCTION. *(E.)* Anuras, S.; Cooke, A. R.; Christensen, J. (Univ. Iowa Med. Coll., Iowa City). *J. Clin. Invest.* 54(3):529-535, 1974.

Transverse muscle strips (2 mm wide) which were cut serially from the gastroduodenal junction in opossums, cats, dogs, and man were subjected to rectangular pulse stimulation of 0.5 millisec pulse duration at frequencies varying from 1-20 Hz to investigate inhibitory innervation at the gastroduodenal junction. The electrical stimulation induced relaxation in strips from the thickened circular muscle proximal to the mucosal junction in all of the opossums and cats, some of the dogs, and 1 human specimen. Weak relaxations also occurred in the first few strips below the mucosal junction in some of the opossums. All other strips contracted or showed no response. The relaxation in opossums was abolished by tetrodotoxin (10^{-7} M) but was not affected by antagonists to adrenergic and cholinergic transmission nor by tripelennamine, methysergide, pentagastrin, secretin, cerulein, or cholecystokinin. The optimal frequency for stimulus-relaxation was 12 Hz. The chronaxy for stimulus-relaxation was 0.85 millisec. Junctional strips displayed greater resistances to stretch than those remote from the gastroduodenal junction. The junctional muscle possessed a nonadrenergic inhibitory innervation which is either absent or not manifested in adjacent muscle of the stomach and duodenum, suggesting the existence of a distinctive inhibitory neural control mechanism for pyloric muscle.

6761 GASTROINTESTINAL GROWTH IN NORMAL MALE AND FEMALE RATS. *(E.)* Younoszai, M. K.; Ranshaw, J. (Coll. Med., Univ. Iowa, Iowa City). *Growth* 38(2):225-235, 1974.

6762 MEASUREMENTS OF THE RATE OF PRODUCTION OF BACTERIA IN THE RUMEN OF BUFFALO CALVES. *(E.)* Singh, U. B.; Verma, D. N.; Varma, A.; Ranjhan, S. K. (Indian Vet. Res. Inst., Izatnagar). *J. Agr. Sci.* 83(1):13-17, 1974.

6763 SECONDARY TERATOGENIC FACTORS. *(E.)* Gonzalo Sanz, L. M.; Velayos, J. L. (Dept. Anat., Univ. Navarra, Pamplona, Spain). *Experientia* 30(7):801-802, 1974.

6764 THE HISTOCHEMICAL DEMONSTRATION OF O-ACYLATED SIALIC ACID IN GASTROINTESTINAL MUCINS. THEIR ASSOCIATION WITH THE POTASSIUM HYDROXIDE-PERIODIC ACID-SCHIFF EFFECT. *(E.)* Culling, C. F. A.; Reid, P. E.; Clay, M. G.; Dunn, W. L. (Fac. Med., Univ. British Columbia, Vancouver, Canada). *J. Histochem. Cytochem.* 22(8):826-831, 1974.

6765 CHEMISTRY OF BILIRUBIN AND BILIVERDIN IN N,N-DIMETHYLFORMAMIDE. *(E.)* Van Norman, J. D.; Szentirmay, R. (Dept. Chem., Youngstown State Univ., Ohio). *Anal. Chem.* 46(11):1456-1464, 1974.

6766 A STUDY ON AMINO ACIDS IN GASTRIC MUCOSA DURING DIFFERENTIATION AND THEIR SIGNIFICANCE. I. *(E.)* Nishioka, T. (Wakayama Med. Univ., Japan). *Experientia* 30(6):659-663, 1974.

6767 THE ISOLATION OF TRYPSIN AND ELASTASE FROM MOOSE PANCREAS (Alces alces) BY AFFINITY CHROMATOGRAPHY ON LIMA-BEAN PROTEASE INHIBITOR - SEPHAROSE RESIN. *(E.)* Lievaart, P. A.; Stevenson, K. J. (Dept. Chem., Univ. Calgary, Alberta, Canada). *Can. J. Biochem.* 52(7):637-644, 1974.

6768 RIBOSOME-MEMBRANE RELATIONSHIPS IN ISCHEMIC LIVERS. *(E.)* Cajone, F.; Schiaffonati, L.; Piccoletti, R.; Bernelli Zazzera, A. (Inst. Pathol. Gen., Univ. Milan, Italy). *Exp. Mol. Pathol.* 21(1):40-51, 1974.

6769 PREPARATION OF β-TRYPSIN BY AFFINITY CHROMATOGRAPHY OF ENTEROKINASE-ACTIVATED BOVINE TRYPSINOGEN. *(E.)* Liepnieks, J. J.; Light, A. (Dept. Chem., Purdue Univ., W. Lafayette, Ind.). *Anal. Biochem.* 60(2):395-404, 1974.

6770 PURIFICATION AND CHARACTERIZATION OF LAMB GASTRIC PROTEASES. *(E.)* Chaudhari, R. V.; Richardson, G. H. (Dept. Nutr., Utah State Univ., Logan). *J. Dairy Sci.* 57(8):860-864, 1974.

6771 INFLUENCE OF PORTAL VEIN OCCLUSION ON RETICULOENDOTHELIAL FUNCTION AND ENDOTOXEMIA. *(E.)* Olcay, I.; Kitahama, A.; Miller, R. H.; Trejo, R. A.; Drapanas, T.; Di Luzio, N. R. (Tulane Univ. Sch. Med., New Orleans, La.). *J. Reticuloendothel. Soc.* 15(6):7a, 1974.

6772 PROTECTION OF SUCKLING MICE FROM EXPERIMENTAL CHOLERA BY MATERNAL IMMUNIZATION: COMPARISON OF THE EFFICACY OF WHOLE-CELL, RIBOSOMAL-DERIVED, AND ENTEROTOXIN IMMUNOGENS. *(E.)* Guentzel M. N.; Berry, L. J. (Dept. Microbiol., Univ. Texas, Austin). *Infect. Immun.* 10(1):167-172, 1974.

6773 TISSUE-BINDING PROPERTIES OF THE CHOLERA TOXIN. *(E.)* Peterson, J. W. (Univ. Texas Med. Branch, Galveston). *Infect. Immun.* 10 (1):157-166, 1974.

6774 THE SELF-ADMINISTERED INTRAGASTRIC ETHANOL INTAKE IN THE RAT. *(Fr.)* Marfaing-Jallat, P.; Pruvost, M.; Le Magnen, J. (C.N.R.S., Coll. France, Paris). *J. Physiol. (Paris)* 68(1):81-95, 1974.

6775 TOTAL TRANSPLANTATION OF THE SMALL INTESTINE IN THE DOG: A SERIES OF UNTREATED HETEROTOPIC HOMOGRAFTS. *(Fr.)* Vignal, J.; Tissot, E.; Moulay, A.; Papathanassiou, Z.; Faure, J. L. (Edouar Herriot Hosp., Lyon, France). *Lyon Chir.* 70(3):211-213, 1974.

6776 SUBTOTAL HEPATECTOMY AND PORTAL PRESSURE: A STUDY IN THE RAT. *(It.)* Palagalli, G. V.; Fusco, A. (Inst. Normal Vet. Anat., Univ. Naples, Italy). *Boll. Soc. Ital. Biol. Sper.* 49(14):849-855, 1973.

6777 PRESENCE OF THE GENUS LACTOBACILLUS (BAIJERINCK) IN THE HUMAN STOMACH. *(Ger.)* Bernhardt, H. (Med. Clin. Polyclin., Ernst Moritz Arndt Univ., Greifswald, Germany). *Zentralbl. Bakteriol.* [*Orig. A*] 226(4):479-490, 1974.

6778 BEHAVIOR OF FETAL AND NEONATAL RAT LIVER MITOCHONDRIA DURING ISOPYCNIC CENTRIFUGATION IN A SUCROSE GRADIENT. *(Fr.)* Mertens-Strijthagen, J.; De Schrijver, C.; Watiaux-De Coninck, S.; Wattiaux, R. (Physiol. Lab., Notre-Dame de la Paix Univ., Namur, Belgium). *Arch. Int. Physiol. Biochim.* 82(1):189, 1974.

6779 SUBCELLULAR FRACTIONATION OF HUMAN LIVER TISSUE. I. ISOLATION OF THE MITOCHONDRIAL FRACTION. *(Rum.)* Benga, G. (no affil.). *Stud. Cercet. Biochim.* 17(2):123-135, 1974.

30 THE COURSE OF GASTROINTESTINAL RADIATION
REACTIONS IN THE RAT (A DEMONSTRATION EX-
RIMENT). *(Ger.)* Neumeister, K.; Jahns, J.; Paul,
(Dept. Med., Karl Marx Univ., Leipzig, Germany).
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aftl. Reihe*] 23(1):29-32, 1974.

31 ACUTE REACTIONS OF THE GASTROINTESTINAL
TRACT OF SWINE TO EXPOSURE TO VARIOUS DOSES
RADIATION. *(Ger.)* Koch, F.; Mehlhorn, G.; Neu-
ister, K.; Panndorf, H.; Johannsen, U.; Gursky, S.;
issner, W. (Dept. Animal Production Vet. Med., Karl
rx Univ., Leipzig, Germany). *Wissenschaftl. Z.
rl Marx Univ.* [*Math. Naturwissenschaftl. Reihe*] 23
):10-14, 1974.

32 MORE PATHOMORPHOLOGICAL STUDIES OF THE
GASTROINTESTINAL TRACT OF SWINE AFTER EX-
SURE TO DIFFERENT DOSES OF RADIATION. *(Ger.)*
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umeister, K. (Dept. Animal Production Vet. Med.,
rl Marx Univ., Leipzig, Germany). *Wissenschaftl. Z.
rl Marx Univ.* [*Math. Naturwissenschaftl. Reihe*] 23(1):
-28, 1974.

83 X-RAY EXAMINATIONS OF GASTROINTESTINAL FUNC-
TION IN DOGS AND RABBITS AFTER WHOLE BODY
RADIATION. *(Ger.)* Papoyan, S. A.; Sagatelyan, G.
(Radiol. Div., Min. Hlth. Armenian SSR, Erevan,
SR). *Wissenschaftl. Z. Karl Marx Univ.* [*Math.
turwissenschaftl. Reihe*] 23(1):27-28, 1974.

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DROME OF RADIATION DISEASE. *(Ger.)* Bertok,
; Kocsar, L. T. (Frederic Joliot-Curie State Res. Inst. Radiat. Biol. Radiat. Hyg., Budapest, Hungary). *Wissenschaftl. Z. Karl Marx Univ.* [*Math. Naturwissenschaftl. Reihe*] 23(1):65-66, 1974.

6785 THE ROLE OF MICROFLORA IN THE PATHOGENESIS OF INTESTINAL RADIATION SYNDROME. *(Ger.)* Mraz, J.; Mandel, L.; Moravek, F. (Purkinje Inst. Med. Res. Postgrad Med., Hradec Kralove, Czechoslovakia). *Wissenschaftl. Z. Karl Marx Univ.* [*Math. Naturwissenschaftl. Reihe*] 23(1):61-64, 1974.

6786 ROLE OF THE INTESTINAL MICROFLORA IN RADIATION PATHOLOGY. *(Ger.)* Kiselev, P. N.; Meter, I. D. (Central Sci. Res. Inst. Roentgenol. Radiol., Leningrad, USSR). *Wissenschaftl. Z. Karl Marx Univ.* [*Math. Naturwissenschaftl. Reihe*] 23(1):67-69, 1974.

6787 NUTRITIONALLY INDUCED ADAPTATION OF THE DIGESTIVE SYSTEM. *(Cz.)* Fabry, P. (Inst. Clin. Exper. Med., Prague, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 28(1):52-59, 1974.

6788 BIOCHEMICAL EVALUATION OF A SIMPLE MODEL OF ISCHEMIA OF THE LIVER. *(Cz.)* Placer, Z.; Bibrova, J.; Vidlakova, M.; Vosnik, J. (Inst. Clin. Exper. Med., Prague, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 28(3):190-194, 1974.

DIAGNOSTIC PROCEDURES

6789 IMPROVEMENT OF PANCREATIC IMAGING. *(E.)* Mattar, A. G.; Laor, Y. (Buffalo Gen. Hosp., N.Y.). *J. Nuclear Med.* 15(8):707-708, 1974.

In a pancreas image study of 8 patients referred for pancreas scanning, i.v. administration of ^{99m}Tc-sulfur colloid was followed 15-30 min later by i.v. injection of ^{75}Se-selenomethionine. Scintillation camera imaging was begun immediately. Multiple positioning of the patients was employed to determine optimum separation of pancreas and liver images: (1) supine; (2) on right side; and (3) on right side with pelvis elevated on a pillow. In all positions, the detector head was adjusted at an anterior oblique angle, tilted 10 degrees cephalad as well as 10 degrees to the right side of the patient. In the shift from supine to right side positions, the spleen moved medially and downward as the liver moved upward and to the right, thus increasing the anatomical separation between the 2 organs and resulting in maximum possible image separation. If it is anticipated that the pancreas image may be masked by that of the liver or if such a situation arises during the scintigraphic examination, the right-sided positions should be used.

6790 ENHANCEMENT OF PANCREATIC CONCENTRATION OF ^{75}SE-SELENOMETHIONINE. *(E.)* Winston, M. A.; Guth, P.; Endow, J. S.; Blahd, W. H. (VA Wadsworth Hosp. Ctr., Los Angeles, Calif.). *J. Nucl. Med.* 15(8):662-666, 1974.

To improve the reliability of pancreas scanning with ^{75}Se-selenomethionine, the effects of various stimulatory agents on tracer uptake (4 µC i.v. or i.p.) were studied in female Wistar rats. Pancreatic tracer concentration was mildly enhanced by bethanechol chloride (1.0 mg/kg i.v.) but was depressed by vasopressin (3.0 U/kg i.p.) and propantheline bromide (3.0 mg/kg i.v.). Glucagon (1.0 mg/kg i.v.) had no effect on tracer accumulation, while pancreozymin-cholecystokinin (4.0-8.0 U/kg i.v.) had little effect although the results were variable. The combination of bethanechol chloride followed by pancreozymin-cholecystokinin increased pancreatic tracer concentration by about 100% compared with control values. The effects of the 5 drugs on the liver and small intestine paralleled pancreas results but with less variation. The combined bethanechol chloride-pancreozymin regimen was evaluated in 15 patients, including 2 with acute pancreatitis, 2 with severe chronic pancreatitis, 1 with a pancreatic pseudocyst, and 10 with no known pancreas disease but with abdominal pain or suspected carcinoma. Bethanechol chloride (5 m.g.) was administered s.c. followed in 15 min by pancreozymin (1 U/kg) instilled i.v. over a 3-4 min period; ^{75}Se-selenomethionine (3 µC/kg) was given 1 min later and imaging begun immediately. The pancreas was readily visualized in all cases except 1 with severe chronic pancreatitis. Visualization was fair to good in the other cases of pancreatitis, excellent in the case of the pseudocyst, and good to excellent in all cases with a normal pancreas. No pancreatic disease was found in the latter group during a 6-month follow-up. Side effects were mild and consisted of slight cramping and nausea during pancreozymin administration. Study of an additional 35 patients yielded no false-positive results despite a high incidence of alcoholism and pancreatic inflammatory conditions. Two cases of pancreatic carcinoma and 1 of severe chronic pancreatitis were discovered due to nonvisualization of all or a portion of the gland. Stimulation of pancreatic tracer uptake by bethanechol chloride and pancreozymin is probably accomplished by a combination of enhanced blood flow and enzyme synthesis.

6791 TECHNIQUE FOR ENDOGASTRIC TITRATION OF GASTRIC JUICE WITH AN INTESTINAL TRANSMITTER. *(Ger.)* Unger, W.; Kaess, H. (Med. Clin., Univ. Heidelberg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:830-832, 1973.

A modification of the technique cf Wolters, et al. was studied *in vitro* and *in vivo* to determine the error involved. The system consisted of 2 tubes fastened to one another. A pump continuously instilled 0.1 N HCl into the stomach through one of these tubes, while the other was used for addition of 1 N KHCO$_3$. An endoradiosonde, consisting of an antimony-zinc electrode and a radio transmitter, was attached to the distal end of the tube system, and the pH was transmitted over an antenna to a receiver attached to an electronically controlled limit value switch which was set to pH 3.5. Bicarbonate was added when the pH fell below this level. The position of the sonde in the stomach was monitored radiologically. A preliminary *in vitro* test demonstrated that errors were less than 5% when HCl was instilled at a rate of 5-20 mEq/30 min. The system was also tested *in vivo* on 10 normal subjects after administration of atropine (1 mg i.v.), 6 patients with histamine-resistant achlorhydria, and 4 patient who had undergone the Billroth II procedure. In all operated patients, more bicarbonate than HCl was used; errors of measurement were less than 25% in 25 test periods and greater than 50% in 10 test periods This is attributed to transpyloric bicarbonate losse Errors of 30% in both directions were found in nonoperated patients with achlorhydria. Influx of bicarbonate from the saliva and duodenal and gastric juice and loss of H$^+$ by transmucosal diffusion and buffering by gastric mucus might account for low values. Acid or bicarbonate could also be lost through the pylorus.

6792 RADIOLOGICAL EXAMINATION OF THE SMALL INTESTINE IN PATIENTS WITH MELANOMA. *(Dut.)* Tuynman, F. H. B.; Lagaaij, M. B. (Acad. Hosp., Leiden, Netherlands). *Ned. Tijdschr. Geneeskd.* 117(38):1412-1415, 1973.

Case reports are presented for 2 men and 1 woman, aged 45-60 yr, who developed multiple metastases in the small intestine from malignant melanomas of the femur, pectoral region, and palate, resp. The period between removal of the primary tumor and detection of metastases in the small intestine was 6.5, 3, and 11 yr, resp. Metastases were detected radiologically in all 3 patients, 2 of whom had no clinic symptoms of intestinal involvement. Nodular or

ypoid filling defects were found in x-rays from
3 patients. Central ulcerations in the metasta-
were visualized as a "target lesion" or "bull's
" or, in 1 case, as a central cleft. An autopsy
this patient showed that all of the many metas-
es in the small intestine had superficial ulcer-
ons. Since hematogenous metastasis of malignant
anomas to the small intestine is relatively com-
, radiological examinations are recommended for
patients when it is important to know about the
sence or absence of metastases. Since it is
ier for the patient to tolerate, simple to per-
m, and gives better results than other techniques,
eroclysis *via* duodenal intubation is recommended
radiological examination of these patients.

3 QUALITATIVE AND QUANTITATIVE BILE ACID ANALYSIS OF URINE AS A DIAGNOSTIC AID IN
DIFFERENTIAL DIAGNOSIS OF JAUNDICE. *(Ger.)*
x, P. (Med. Clin., Univ. Freiburg, Germany).
a. *Dtsch. Ges. Inn. Med.* 79:950-952, 1973.

studies of the sulfate ester fraction of bile
is, differences were found in urinary excretion
3β-hydroxy-5-cholenic acid, which is produced
in the liver, and deoxycholic acid, produced
side the liver, in various forms of cholestasis.
acute hepatitis deoxycholic acid accounted for
of the total bile acids in the urine and 3β-
roxy-5-cholenic acid for about 5%. In 1 patient
intrahepatic cholestasis and greatly decreased
secretion, 3β-hydroxy-5-cholenic acid made up
of total bile acids in the urine, while deoxy-
lic acid was present only in small quantities.
plete obstruction of the extrahepatic biliary
ct was accompanied, in 4 of 5 patients, by ab-
ce of deoxycholic acid in the urine, while 3β-
roxy-5-cholenic acid accounted for as much as 15%
the total bile acids. A compound was also detec-
which had the same retention time as cholesterol,
its identity must be confirmed by mass spectro-
ry. It is proposed that quantitative determina-
ns of urinary deoxycholic acid and 3β-hydroxy-5-
lenic acid be used as an aid in the differential
gnosis of jaundice.

INDIRECT ISOTOPIC LYMPHOGRAPHY OF THE LIVER: ORIGINAL CONTRIBUTION. SYSTEMATIC
Y. *(Fr.)* Van Waes, L.; Beeckman, P.; Dewinter,
Demeulenaere, L. (St. Andre Clin., Tielt, Bel-
). *Med. Chir. Dig.* 2(5):287-293, 1973.

r injection of 250 μC of colloidal ^{198}Au into
capsule of the liver under laparoscopic control,
r scans were obtained on 13 patients with various
r diseases, including 8 with cirrhosis, and on 3
ents with no evidence of liver disease. Media-
al lymph drainage was demonstrated in 14 of these
atients. In the remaining 2 cases, ^{198}Au may
migrated later and been missed because of the
t half-life of this isotope. Since 1 of these
tients had a normal liver biopsy, this finding
ot considered pathological. In some noncirrhotic
ents, portal lymph nodes were demonstrated along
posterior but no anterior mediastinal drainage,
suggesting the presence of anastomoses between the superficial and deep lymphatics. In all but one of the patients with cirrhosis, ^{198}Au migrated through the deep lymphatics toward the porta hepatis and thoracic duct. This is probably due to involvement of superficial lymphatics in the fibrotic process, rather than to the existence of anastomoses. No migration of ^{198}Au occurred in a patient with cirrhosis complicated by right hydrothorax. This finding indicates that hydrothorax does not result from dynamic insufficiency of the mediastinal lymphatics since this would necessitate that the superficial lymphatics remain permeable. In another patient, anterior mediastinal drainage of lymph persisted although a diagnosis of cirrhosis was confirmed by biopsy. This finding may indicate that the patient was in the early stages of cirrhosis, before portal hypertension developed. Injection of colloidal ^{198}Au into the hepatic parenchyma in 2 patients gave liver scans which masked lymph drainage.

6795 SELECTIVE VISCERAL ANGIOGRAPHY IN THE DIAGNOSIS AND TREATMENT OF GASTROINTESTINAL HEMORRHAGE. *(E.)* Rau, II, R. M.; Thompson, Jr., R. J.; Simmons, C. R.; Hinshaw, D. B.; Branson, B. (Loma Linda Sch. Med., Calif.). *Am. J. Surg.* 128(2):160-167, 1974.

6796 ANGIOGRAPHY IN ACUTE ABDOMINAL DISORDERS. *(E.)* Buchler, E. (Dept. Radiol., Univ. Bonn, Germany). *Acta Chir. Belg.* 72(5):355-363, 1973.

6797 ANAL FISTULOGRAPHY. *(E.)* Ahlback, S.; Holmstrom, B.; Syk, B. (St. Gorans Hosp., Stockholm, Sweden). *Acta Radiol.* [*Diag.*] *(Stockh.)* 15(3):281-287, 1974.

6798 COMPARISON OF SECRETIN AND CHOLECYSTOKININ IN THE DIAGNOSIS OF PANCREATIC DISEASE. *(E.)* Petersen, H.; Berstad, A.; Myren, J. (Ullevaal Univ. Hosp., Oslo, Norway). *Rend. Gastroenterol.* 5(3):174-182, 1973.

6799 ANGIOGRAPHY IN IDENTIFYING THE SOURCE OF INTESTINAL BLEEDING. *(E.)* Alfidi, R. J. (Cleveland Clin., Ohio). *Dis. Colon Rectum* 17(4): 442-446, 1974.

6800 HAEMODYNAMIC AND ANGIOGRAPHIC STUDY OF PORTAL HYPERTENSION UNDER THE WARREN-VIAMONTE PANANGIOGRAPHIC METHOD. *(E.)* Castrucci, A.; De Medici, L.; Valenti, M. (San Camillo Hosp., Rome, Italy). *Rend. Gastroenterol.* 5(3):232, 1973.

6801 THE RATIO OF GLUTAMATE-PYRUVATE TRANSAMINASE/ALKALINE PHOSPHATASE IN LIVER DISEASE. *(Sp.)* Ledro Molina, D. (Fac. Med., Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 43(2):183-192, 1974.

6802 HAPTOGLOBIN CONTENTS IN CIRRHOSIS. *(Rus.)* Zamchii, A. A.; Zherebtsov, L. A. (Inst. Hematol. Blood Transfusion, USSR). *Lab. Delo* (11): 651-653, 1973.

6803 ENZYME FINDINGS IN HISTOLOGICAL EXAMINATION OF LIVER BIOPSIES IN METABOLIC DISORDERS. *(Cz.)* Petzold, H. (Clin. Intern. Med., Karl Marx Univ., Leipzig, Germany). *Cesk. Gastroenterol. Vyz.* 27(8):535-539, 1973.

6804 TRANSPARIETOHEPATIC CHOLANGIOGRAPHY. *(Sp.)* Urdaneta, A. B.; Morillo, A. V.; Nunez, A. P. (Marcaibo Univ. Hosp., Venezuela). *GEN* 27(3/4): 259-286, 1973.

6805 RADIOACTIVITY (^{75}Se-SELENIOMETHIONINE) IN THE POST-SECRETIN-PANCREOZYMIN DUODENAL ASPIRATE: A NEW TEST IN THE DIAGNOSIS OF CHRONIC PANCREATITIS. *(E.)* Scuro, L. A.; Dobrilla, G.; Franchi, R.; Marabini, C.; Pasoli, R. (Inst. Med. Pathol., Univ. Padova, Italy). *Rend. Gastroenterol.* 5(3):234, 1973.

6806 NEWER APPROACHES TO THE PROBLEM OF COLORECTAL CANCER. *(E.)* Burdette, W. J. (Univ. Texas Med. Sch., Houston). *Dis. Colon Rectum* 17(4):462-468, 1974.

6807 DIAGNOSTIC POSSIBILITIES FOR SPECIALISTS IN GASTROENTEROLOGY. *(Ger.)* Teubner, K. (no affil.). *Fortschr. Med.* 91(33):1295-1297, 1973.

6808 ADVANCES IN GASTROENTEROLOGICAL ENDOSCOPY AND BIOPSY IN THE LAST TEN YEARS. *(Ger.)* Koelsch, K. A. (Reg. Hosp., Magdeburg-Altstadt, Germany). *Dtsch. Z. Verdauung. Stoffwechselkr.* 33(2): 79-84, 1973.

6809 GASTRIC LYMPHOSARCOMAS. DIAGNOSTIC VALUE OF GASTROSCOPY AND DIRECTED GASTRIC BIOPSIES. *(Fr.)* Cornet, A.; Barbier, J. P.; Carnot, F. (Laennec Hosp., Paris, France). *Sem. Hop. Paris* 50(25):1673-1682, 1974.

6810 COMBINED ENDOSCOPIC EXAMINATIONS IN THE DIAGNOSIS OF DISEASES OF THE UPPER GASTROINTESTINAL TRACT. *(Rus.)* Sotnikov, V. Ni.; Kornilov, Iu. M.; Beigarov, B. I. (N. I. Pirogov 2nd Moscow Med. Inst., USSR). *Sov. Med.* (10):62-68, 1973.

6811 FIBERESOPHAGOSCOPY: ITS ADVANTAGES AND HAZARDS. *(Cz.)* Skerik, P.; Tichy, S.; Nosek, S. (Thomayerovy Hosp., Prague, Czechoslovakia). *Cas. Lek. Cesk.* 112(42):1289-1292, 1973.

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6813 EVALUATION OF 1500 EMERGENCY ENDOSCOPIES PERFORMED FOR GASTROINTESTINAL BLEEDING, ESOPHAGEAL AND GASTRIC LESIONS, AND FOREIGN BODIES IN THE ESOPHAGUS, STOMACH, DUODENUM, AND BILIARY TRACT. *(Fr.)* Merle, M.; Bigard, M. A.; Gaucher, P. Vicari, F.; Laurent, J.; Jeanpierre, R.; Moulinier, B.; Grenier-Boley, P.; Segal, S.; Diot, J.; Delmotte J. S.; Filoche, B.; Vosse-Matagne, G. (Brabois Univ. Hosp. Ctr., Nancy, France). *Acta Chir. Belg.* 72(5): 364-373, 1973.

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6816 BENIGN DUODENAL TUMORS: COMPARISON OF RADIOLOGY AND ENDOSCOPY. *(Fr.)* Barbier, J. P. (Laennec Hosp., Paris, France). *Sem. Hop. Paris* 50(25):1683-1689, 1974.

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6818 COMPARISON OF RESULTS FROM INTRAARTERIAL LIPIODOL HEPATOGRAPHY AND LIVER SCANNING WITH ^{99m}Tc SULFOCOLLOIDS. *(Fr.)* Tavernier, J.; Delorme, G.; Ducassou, J.; Rabin, A.; Diard, F.; Marc, J. (St. Andre Hosp., Bordeaux, France). *Ann. Radiol. (Paris)* 17(3):205-211, 1974.

6819 INTRAHEPATIC PRESSURE: STUDY OF FORTY PATIENTS. *(Sp.)* Hita Perez, J.; Muro, J. de Dios Vega, J.; Perez Jimenez, F.; Mino Fugarolas, G. (La Paz Munic. Sanit., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 43(2):177-182, 1974.

6820 THE USE OF CERULEIN IN RADIOLOGICAL EXAMINATIONS OF THE GASTROINTESTINAL TRACT. *(It.)* Oliva, E. (San Gennaro Hosp., Naples, Italy). *Radiol. Med. (Milano)* 59(5):440-445, 1973.

6821 SERUM XANTHINE OXIDASE ACTIVITY IN PATIENT WITH SURGICAL DISEASES OF THE LIVER, BILIARY TRACT, AND OTHER DISEASES. *(Rus.)* Diachina, E. G. (Khar'kov Sci. Res. Inst. Gen. Emergency Surg. USSR). *Lab. Delo* (11):647-649, 1973.

6822 VALUE OF SIMULTANEOUSLY DETERMINING HEPATIC BLOOD FLOW AND CARDIAC OUTPUT BY RADIOISOTOPES IN SOME LIVER DISEASES IN ELDERLY PATIENTS. *(It.)* Tarolo, G.; Roncari, G.; Michetti, A.; Gatti, A. (District Hosp., Varese, Italy). *Radiol. Med. (Torino)* 59(5):417-427, 1973.

6823 RADIOLOGICAL DIAGNOSIS OF THE BILIARY TRACT: METHODS AND FINDINGS. *(Ger.)* Wenz, W. (Inst. Radiol. Diagn., Univ. Freiburg/Breisgau, Germany). *Fortschr. Med.* 91(33):1291-1294, 1973.

6824 VALUE OF BILIGRAPHY WITH A SMALL DOSE OF CONTRAST MEDIUM: IMPORTANCE OF BLOOD LEVELS. *(It.)* Colagrande, C.; Chieppa, L.; Parrella, R. E.; Vincenzoni, M. (A. Gemelli Polyclin., Rome, Italy). *Radiol. Med. (Torino)* 59(5):428-439, 1973.

6825 DOUBLE-BLIND TRIAL OF A NEW BILIARY CONTRAST MEDIUM. *(Ger.)* Muller, M.; Sirth, W.; Hugentobler, R. (Cantonal Hosp., Zurich, Switzerland). *Praxis* 62(9):1517-1518, 1973.

6826 RESOLUTION POWER AND DIAGNOSTIC VALUE OF CHOLECYSTO-CHOLEGRAPHIC METHODS OF EXAMINING THE BILIARY TRACT. *(Rus.)* Rabkin, I. Kh.; Barmin, V. S.; Movchin, A. A.; Sukhomlina, R. A. (Inst. Clin. Exp. Surg., Moscow, USSR). *Sov. Med.* (8):120-125, 1973.

6827 PERCUTANEOUS TRANSHEPATIC PREOPERATIVE CHOLANGIOGRAPHY. *(Rus.)* Malyshev, Iu. I.; Gorbunov, O. M.; Pyt'eva, G. P. (D. I. Ul'ianov Med. Inst., Kuibyshev, USSR). *Klin. Khir.* (7):13-18, 1973.

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6829 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY BEFORE REOPERATION ON THE DESCENDING BILIARY TRACT. *(Ger.)* Ristig, W.; Schirmer, H. F.; Steckenmesser, R. (Radiol. Ctr., Justus Liebit Univ., Giessen, Germany). *Fortschr. Roentgenstr.* 120(5): 536-541, 1974.

6830 SIDE EFFECTS AND COMPLICATIONS FOLLOWING EXCRETORY ROENTGEN-CONTRAST EXAMINATIONS OF THE BILIARY TRACT. *(Rus.)* Barmin, V. S.; Movchun, A. A. (All-Union Sci. Res. Inst. Clin. Exp. Surg., Moscow, USSR). *Sov. Med.* (9):108-112, 1973.

6831 BICARBONATE CONCENTRATION IN GASTRIC JUICE AND ITS VALUE IN THE DIAGNOSIS OF CHRONIC GASTRITIS. *(Rus.)* Matsaenko, N. K. (Kiev Med. Inst., USSR). *Lab. Delo* (11):643-645, 1973.

6832 DIAGNOSIS OF CHRONIC PANCREATITIS. *(Ger.)* Schulz, H. J.; Dietze, F.; Hoppe, K.; Lisewski, G.; Markwardt, J.; Munster, W.; Reitzig, P. (Dept. Med., Charite Hosp., Berlin, Germany). *Dtsch. Gesundheitsw.* 29(1):19-23, 1974.

6833 NEW METHOD FOR INVESTIGATING AUSTRALIA ANTIGEN: RESULTS IN COMPARISON TO OTHER TECHNIQUES. *(Sp.)* Prados Madrona, D.; Rodriguez Fernandez, J. M.; Leon Lara, A.; Gallego Cubiles, R. (Manuel Lois Garcia Sanit., Huelva, Spain). *Rev. Clin. Esp.* 129(5):439-442, 1973.

6834 THE VALUE OF DETERMINING AUSTRALIA ANTIGEN (HAA) FOR CLINICAL MANAGEMENT OF HEPATITIS. *(Ger.)* Reinhardt, M.; Schmitz, J.; Jorke, D. (Munic. Hosp., Jena, Germany). *Dtsch. Z. Verdauung. Stoffwechselkr.* 33(2):57-78, 1973.

See also, 6871, 7050, 7052, 7070, 7075, 7084, 7085, 7134, 7186, 7196, 7306.

GASTROINTESTINAL DISEASES

ESOPHAGUS

6835 ARGYROPHIL CELLS AND MELANOCYTES IN ESOPHAGEAL MUCOSA.

(E.) Tateishi, R.; Taniguchi, H.; Wada, A.; Horai, T.; Taniguchi, K. (Ctr. Adult Dis., Osaka, Japan). *Arch. Pathol.* 98 (2):87-89, 1974.

Esophagi from consecutive autopsies in Japan were examined for the presence of argyrophil cells and melanocytes. Of the 50 esophagi, 14 contained argyrophil cells, and another 4 contained melanocytes. The 14 esophagi containing argyrophil cells were devoid of melanocytes. Argyrophil cells were unevenly and sparsely distributed in the basal parts of the squamous epithelium; they were never observed among the cells lining the ducts and acini of the esophageal glands. The melanocytes were located in the basal layer of the mucosa. Their dentritic processes were long, tortuous, and extending into the intercellular spaces among other squamous epithelial cells. The results suggest that argyrophil cells are functionally different from melanocytes, and that the incidence of both types may vary among different races. In view of the evidence that bronchial argyrophil cells are the origin of pulmonary oat cell carcinoma, it is hypothesized that oat cell carcinomas in the esophagus are derived from the argyrophil cells in that site.

6836 EFFECT OF AN ANTERIOR FUNDOPLICATION ON LOWER ESOPHAGEAL SPHINCTER COMPETENCE.

(E.) Behar, J.; Biancani, P.; Spiro, H. M.; Storer, E. H. (VA Hosp., West Haven, Conn.). *Gastroenterology* 67(2):209-215, 1974.

The effect of an anterior fundoplication on lower esophageal sphincter competence was studied in 10 patients with reflux esophagitis. Twelve medically treated patients served as controls. Prior to treatment, the incidence of esophageal symptoms and abnormal findings were similar in both groups. All but 1 had a sliding hiatus hernia; most had abnormal esophagoscopy (86%) and a positive acid infusion test (100%). Eight patients had a successful fundoplication, as determined by symptomatic response, adequate repair of the hiatus hernia, negative acid infusion test, and esophagoscopy. In these patients, the mean resting lower esophageal sphincter pressure rose from 10.9 to 24.4 mm Hg and gastroesophageal reflux could not be demonstrated with the pH probe. The pressure increases were not accompanied by restoration of lower esophageal sphincter function determined by sphincter response to graded increments of gastric pressure. The sphincter response was equal to or less than that of gastric pressure increments before and 1 yr after surgery. The remaining 2 surgical patients had recurrence of hiatus hernia. Lower esophageal pressures in these patients rose from 8.5 ± 2.5 mm Hg to only 13.0 ± 9.0 mm Hg and gastroesophageal reflux was readily demonstrated. Regardless of the symptomatic and objective response to medical management (30 ml AlMgOH, 3 times/day, plus bland diet, weight reduction, and liquid antacids), mean resting lower esophageal sphincter pressures and gastroesophageal reflux remained unchanged in the 12 controls after 1 yr of continuous medical treatment.

6837 EPIDERMOLYSIS BULLOSA OF THE OESOPHAGUS WITH OESOPHAGEAL WEB FORMATION.

(E.) Marsden, R. A.; Gowar, F. J. S.; MacDonald, A. F.; Main, R. A. (Aberdeen Roy. Infirm., Scotland). *Thorax* 29(3):287-295, 1974.

Four members (3 women and 1 man, aged 16-28 yr) of a family of 8 had epidermolysis bullosa dystrophica of probable recessive inheritance. In these 4 cases the typical blistering of the skin and oral mucosa had been relatively inconspicuous since infancy. Two patients presented with severe dysphagia but in the others the dysphagia remained comparatively mild. Hemorrhage and regurgitation of blood, with varying degrees of severity, occurred in 3. Radiological evidence of narrowing and irregularity of the upper 1/3 of the esophagus was present in all 4 and was severe in 2. Treatment of the patients with esophageal stenosis by esophagoscopy and bouginage resulte in relief from symptoms, but improvement was not always immediate or long lasting. Routine barium swallow studies in 2 and rapid films in 2 showed the pre ence of postcricoid webs. The webs were single tran verse structures of the type seen in the Paterson-Brown Kelly syndrome. Although the webs may have resulted from the blistering and scarring process of epidermolysis bullosa, the presence of a smooth tong in 4 patients and anemia in 2 suggests the coexisten of the Paterson-Brown Kelly syndrome.

6838 CERVICAL ESOPHAGEAL WEBS - A ROENTGEN-ANATOMIC CORRELATION.

(E.) Clements, Jr., J. L.; Cox, G. W.; Torres, W. E.; Weens, H. S. (Grady Mem. Hosp., Atlanta, Ga.). *Am. J. Roentgenol Radium Ther. Nucl. Med.* 121(2):221-231, 1974.

Video tape recordings of the proximal or cervical esophagus and pharynx in 100 unselected patients (21 with dysphagia) were examined for the presence of (1) webs or folds, (2) postcricoid impressions, and (3) cricopharyngeal indentations. In addition, the cervical esophagus, trachea, and larynx were removed *en bloc* from 50 unselected cadavers at autopsy for study as anatomic specimens. Webs and folds (thin, shelf-like transverse projections on the anterior mucosal surface of the proximal pharyngoesophageal junction and esophagus) were found in 8 patients (8%), 2 with dysphagia. The webs were also seen in 8 anatomic specimens (16%), 5 from women and 3 from men, aged 30-73 yr, all without a history of dysphagia. Postcricoid impression (a nodular or beak-like impression on the anterior mucosal surface of the cervical esophagus immediately below the level of the cricoid cartilage) was present in 71 patients (71%); 13 of these had dysphagia. In the anatomic specimens, this defect was not demonstrated because clamps during examination obliterated them. Cricopharyngeal indentation

rounded or tongue-like impression found on the
osterior mucosal surface of the cervical esophagus)
ppeared in 18 patients (18%), only 1 of whom had
ysphagia. The anatomic specimens demonstrated 13
f these defects, including 1 specimen with a web
lso present. The histology of esophageal webs and
olds is that of normal mucosa as opposed to the
lummer-Vinson syndrome in which muscular atrophy,
eratinization, or inflammatory changes occur. The
eb is probably of no clinical significance as it
roduces no clinical symptoms. The postcricoid in-
entation is a normal variant unrelated to any par-
icular disorder, but pronounced cricopharyngeal in-
entations may reflect cricopharyngeal abnormality.

339 ESOPHAGEAL PRESSURE STUDIES IN PATIENTS WITH CARCINOMA OF THE ESOPHAGUS. *(E.)*
eschel, H.; Beck, I. T. (Hotel Dieu Hosp., Kingston,
anada). *Can. J. Surg.* 17(4):211-216, 1974.

sophageal pressure studies were performed on 10 pa-
ients (7 men and 3 women, aged 52-90 yr) with car-
inoma of the esophagus. In 6 patients (Group A)
he neoplasm was in the area of the esophagogastric
unction and in 4 (Group B) it involved the body of
he esophagus. Five Group A patients had primary
denocarcinoma of the upper stomach or lower esopha-
us, while 1 had a metastatic intraperitoneal car-
inoma that invaded the esophagogastric junction
rom outside. Three Group B patients had primary
quamous cell tumors and 1 had a metastatic media-
tinal carcinoma encircling the mid-esophagus. No
onsistent motor pattern was detected in the 10 pa-
ients. Motor abnormalities observed in primary and
etastatic carcinoma were not essentially different
rom each other, and differences between groups were
etectable mainly in lower esophageal sphincter func-
ion. The function was abnormal in 3 of 4 Group A
atients studied and normal in all 4 Group B patients.
ne patient in Group A and 2 in Group B had entirely
ormal tracings. An almost consistent finding was
levation of the baseline pressure in the body of
he esophagus (found in 5 Group A and 2 Group B pa-
ients). The elevation was attributed to increased
uscle tone, possibly due to work hypertrophy of the
ortion of the esophagus proximal to the obstructing
arcinoma. Since the esophageal motor pattern of
atients with carcinomas may resemble that of benign
otor dysfunction, motility studies are not helpful
n recognizing carcinoma of the esophagus and may
ead to confusion in diagnosis.

340 GASTRIC TUBE ESOPHAGOPLASTY. *(E.)* Cohen,
D. H.; Middleton, A. W.; Fletcher, J. (Roy.
lexandra Hosp. Children, Sydney, Australia). *J.
ediatr. Surg.* 9(4):451-455, 1974.

841 PERFORATION OF THE ESOPHAGUS. *(E.)* Ros-
sof, Sr., L.; White, E. J. (Univ. Southern
alifornia Sch. Med., Los Angeles). *Am. J. Surg.*
28(2):207-218, 1974.

6842 OBSERVATIONS ON CARCINOMA OF THE OESOPHAGUS. *(E.)* Tandon, R. K.; Gupta, S. B. (S. N. Med. Coll., Agra, India). *Indian J. Chest Dis.* 16(1):11-20, 1974.

6843 AN EXCLUSIVE RIGHT THORACIC APPROACH FOR CANCER OF THE MIDDLE THIRD OF THE ESOPHAGUS. *(E.)* Belsey, R.; Hiebert, C. A. (Frenchay Hosp., Bristol, England). *Ann. Thorac. Surg.* 18(1): 1-15, 1974.

6844 TREATMENT OF MALIGNANT ESOPHAGEAL OBSTRUCTION BY ENDOESOPHAGEAL INTUBATION. *(E.)* Thomas, A. N. (San Francisco Gen. Hosp., Calif.). *Am. J. Surg.* 128(2):306-314, 1974.

6845 ADENOCARCINOMA INVOLVING THE ESOPHAGUS. *(E.)* Hankins, J. R.; Cole, F. N.; Attar, S.; Frost, J. L.; McLaughlin, J. S. (Univ. Maryland Sch. Med., Baltimore). *J. Thorac. Cardiovasc. Surg.* 68(1):148-158, 1974.

6846 PRIMARY MALIGNANT MELANOMA OF THE ESOPHAGUS: A CASE REPORT. *(E.)* Hendricks, Jr., G. L.; Barnes, W. T.; Suter, H. J. (Geisinger Med. Ctr., Danville, Pa.). *Am. Surg.* 40(8):468-473, 1974.

6847 SCHATZKI'S RING: STUDY OF TEN CASES. *(Sp.)* de las Casas Alonso, P.; Hage Made, A. (Nuestra Senora de la Candelaria Sanit., Santa Cruz de Tenerife, Canary Islands). *Rev. Esp. Enferm. Apar. Dig.* 43(2):147-152, 1974.

6848 SURGICAL AND COMBINED THERAPY FOR CANCER OF THE ESOPHAGUS AND GASTRIC CARDIA. *(Rus.)* Avilova, O. M.; Dedkov, I. P. (Kiev Inst. Postgrad. Med., USSR). *Klin Khir.* (11):25-31, 1973.

6849 RING IN THE MIDESOPHAGUS. *(Sp.)* Herrerias Gutierrez, J. M.; Mino Fugarolas, G.; Jimenez Pereperez, J.; Osorio Sanche, M.; Jurado Nieto-Guerrero, M.; Hitos. (Fac. Med., Cadiz, Spain). *Rev. Esp. Enferm. Apar. Dig.* 43(2):219-224, 1974.

6850 SUPPORTING MASK FOR TUBES USED IN ESOPHAGOGASTRIC COMPRESSION. *(Sp.)* Madureri, V. (Gen. Hosp., Venezuelan Inst. Social Welfare, Caracas). *GEN* 27(3/4):255-257, 1973.

6851 RESPIRATORY PRESSURE INVERSION POINT AND THE ESOPHAGOGASTRIC SPHINCTER. *(Rum.)* Vlad, C. M. (Inst. Med. Pharm., Bucharest, Rumania). *Fiziol. Norm. Patol.* 19(1):31-41, 1973.

6852 THERAPEUTIC ENDOSCOPY IN THE UPPER GASTROINTESTINAL TRACT. *(Ger.)* Koch, H.; Classen, M.; (Med. Clin. Polyclin., Univ. Erlangen, Germany). *Fortschr. Med.* 91(19):807-808, 1973.

ESOPHAGUS

6853 ACUTE, MASSIVE BLEEDING OF THE UPPER GASTROINTESTINAL TRACT. *(Ger.)* Schmauss, A. K. (Friedrichshain Hosp., Berlin, Germany). *Zentralbl. Chir.* 98(43):1521-1530, 1973.

See also, 6810, 6811, 6812, 7172, 7278.

STOMACH

6854 BILE REFLUX GASTRITIS: RESULTS OF SURGICAL THERAPY WITH ROUX-EN-Y GASTROJEJUNOSTOMY.

(E.) Eckstam, E. E.; Scudamore, H. H.; Fencil, W. J.; Jaramillo, C. A. (Monroe Clin., Wis.). *Wis. Med. J.* 73(7):S75-S78, 1974.

Bile reflux-induced gastritis was studied in 20 surgically treated patients and in a larger group of 42, most of whom were medically treated. Surgical procedures performed on the 20 patients were cholecystectomy (10), 3/4 gastric resection (5), vagotomy and pyloroplasty (4), diaphragmatic hernia repair (3), and vagotomy and antrectomy (2). Epigastric pain was present in all patients in each group. Significant numbers of patients also had nausea, vomiting, gas, anorexia, diarrhea, and weight loss. A few had heartburn, dumping syndrome, and dysphagia. The incidence of nausea, vomiting, gas, heartburn, and diarrhea was much higher in the 20 surgically treated patients than in the larger group. Gastric analysis showed that the surgical group had somewhat less acidity. At gastroscopy, superfical gastritis was seen in all and was associated with hypertrophic, atrophic, or erosive gastritis in some. The redness was usually more severe in the resected stomachs, and free bile and bile-stained mucus were seen between the markedly edematous folds. Reflux of bile through the pylorus or stomach was common. X-ray films were of no value in the diagnosis of gastritis. Biopsies confirmed the diagnosis of gastritis and showed an increase in the number of lymphocytes and plasma cells in the lamina propria associated with edema and increased vascularity. Of 20 patients treated with cholestryamine (4 g 4 times/day or 2 g every 2 hr), 10 reported good results, 4 fair, and 6 poor. Results of ulcer therapy in 7 patients were poor. Of 20 patients who underwent a Roux-en-Y anastomosis, 10 are well despite the presence of bile in 4 and 5 are improved, with bile found in 1. The Roux-en-Y procedure was more effective in preventing bile reflux in the 4 patients in whom the length of the gastric limb of the Y was 75 cm, rather than the usual 50 cm. Anastomotic edema was present in the early preoperative period but cleared within 3 months.

6855 NONOBSTRUCTIVE MUCOSAL DIAPHRAGMS OR RINGS OF THE GASTRIC ANTRUM IN ADULTS.

(E.) Ghahremani, G. G. (Med. Coll. Virginia Hosp., Richmond). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(2):236-247, 1974.

Nonobstructive antral diaphragm was demonstrated in 6 patients (4 women and 2 men, aged 28-66 yr) seen over a 3-yr period. Five patients presented with a prolonged history of postprandial epigastric pain and sensation of fullness. Symptoms were due to associated hiatal hernia, manifested by a Schatzki's ring in 3 and by a patulous gastroesophageal junction and reflux in 1, duodenal ulcer in 2, and superficial gastric ulcer in 1. Roentgenographic demonstration of antral diaphragm required examination of the relaxed patient in recumbent oblique position, and maximal air-contrast distention of the stomach. The lesion presented as a persistent, sharp, symmetric annular structure dividing the antrum. The diaphragm was 2.0-3.5 mm thick and the diameter of the aperture was 1 cm or more. Premedication with anticholinergic drugs facilitated both roentgenologi and gastroscopic visualization of the lesion. At gastroscopy the antral diaphragm was clearly seen to project into the lumen. The coexistence of Schatzki' ring and antral diaphragm in 3 patients, and the similarities between the 2 lesions, suggests that th antral diaphragm also demarcates the transitional zone of 2 different mucosal linings. Since antral diaphragms with an aperture of 1 cm or greater do not require surgery, treatment was directed toward the associated abnormalities.

6856 ON MEASUREMENT OF BASAL ACID OUTPUT FROM THE STOMACH.

(E.) Malmstrom, J.; Stadil, F.; Rehfeld, J. F. (Rigshosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(4):391-393, 1974.

Spontaneous gastric acid secretion was studied in 52 unoperated patients with dyspeptic complaints and 48 patients with truncal vagotomy and pyloroplasty for duodenal ulcer. The stomach was emptied by aspiration of fasting gastric juice over a 15-min period, and then four 15-min collections were made. In oper ated patients, both acid concentration and acid outp were significantly lower in the last 15-min collecti than in the 1st and 2nd. However, volumes of the fo 15-min collections did not differ significantly. In vagotomized patients, similar but more marked change occurred since acid concentration and output in the last collection were significantly lower than all 3 previous samples. The volume of the last collectio was significantly lower than the first 2 samples bu did not differ from the immediately preceding colle tion. In operated and unoperated patients alike, basal acid output was significantly lower when calculated from the last 30 min samples compared with the samples from the whole 60-min period. The mechanisms responsible for the decreased values with ti are unknown. It is suggested that spontaneous secre tion should be measured over a longer period than th 1 hr customarily employed, especially in postvagoto studies.

6857 GASTRIN LEVELS FOLLOWING THERMAL INJURY.

(E.) Newsome, T. W.; Asch, M. J.;

McGuigan, J. E.; Pruitt, Jr., B. A. (Brooke Army Med. Ctr., Fort Sam Houston, Tex.). *Arch. Surg.* 107(4):622-624, 1973.

Previously, normal levels of gastric acid secretion have been demonstrated in burn patients, even those with Curling ulcer. In the present study, serum gastrin levels were measured serially in 22 patients (18 men and 4 women, 2-68 yr) with burns ranging over 30-90% of body surface. Nine patients developed sepsis, while 3 of the 4 who died had massive upper gastrointestinal bleeding; autopsy showed duodenal ulcers in 2 and gastric ulcer in the 3rd patient. With 2 exceptions (10 and 15 times normal), all patients studied had serum gastrin levels in the normal range but predominantly at the lower end. Although not statistically significant in this small sample, the finding that bleeding occurred in 3 of the 12 patients with serum gastrin levels higher than 50 μμg/ml may be worthy of further study. No correlation was seen between gastrin secretion and magnitude of burn injury, postburn interval, sepsis, or occurrence of gastroduodenal ulceration. By demonstrating that hormonal stimulus for gastric acid secretion is unaltered by burn injury, this study reemphasizes the apparently secondary role of gastric acid in the pathogenesis of Curling ulcer, with the primary role assigned to defects in the barrier function of the gastric mucosa.

6858 GASTRIC JUICE LACTIC ACIDOSIS. THE INCIDENCE OF GASTRIC JUICE LACTIC ACIDOSIS IN GASTRIC CANCER AND BENIGN GASTRIC DISEASE IN COMMUNITIES OF HIGH AND LOW GASTRIC CANCER INCIDENCE. *(E.)* Kasugai, T.; Orwell, R.; Clarke, A. D.; Piper, D. W. (Dept. Med., Univ. Sydney, Australia). *Am. J. Dig. Dis.* 19(7):599-602, 1974.

Excess production of lactic acid is a characteristic feature of gastric carcinoma. To determine the value of this abnormality in detecting patients at risk for gastric cancer, the incidence of gastric juice lactic acidosis in a Japanese population with a high gastric cancer incidence was compared with that of an Australian population with a low incidence. Mean basal lactic acid concentration was higher in the gastric juice of 310 Australian patients than in the gastric juice of 66 Japanese patients without gastric cancer. The proportion of persons with a lactic acid concentration over 100 μg/ml was similar in both groups. Early gastric cancer, studied in 118 Japanese, was associated with increased lactic acid concentration. In advanced cancer, gastric juice lactic acidosis was present in both Japanese and Australian groups, but the 2 populations did not differ with regard to mean lactic acid concentration or to the proportion with concentrations over 100 μg/ml. The progressive increase and severity of gastric juice lactic acidosis observed with advancing cancer suggests that the abnormality may arise from the malignant lesion itself. The higher lactic acid concentrations found in advanced cancer cases probably reflect the increased cell mass in which glycolysis is the major metabolic pathway. Acid output, measured in 61 Australians with gastric ulcer and 38 with gastric carcinoma, showed no correlation with lactic acid concentration, suggesting that atrophic gastritis is not a major determinant of the lactic acid concentration.

6859 A FOLLOW-UP STUDY OF SUBTOTAL GASTRECTOMY IN INFANCY AND EARLY CHILDHOOD. *(E.)* Tsuchida, Y.; Makino, S. I.; Ishida, M. (Dept. Pediatr. Surg., Univ. Tokyo, Japan). *J. Pediatr. Surg.* 9(4):499-500, 1974.

6860 INSTRUMENT FOR THE REMOVAL OF A GASTRIC BEZOAR. *(E.)* Wholey, M. H.; Zikria, E. A.; Mansoor, M. (Shadyside Hosp., Pittsburgh, Pa.). *Acta Radiol.* 15(3):333-336, 1974.

6861 ACTIVE TOTAL GASTRECTOMY FOR CANCER OF THE STOMACH: END RESULTS. *(E.)* McNeer, G.; Bowden, L.; Booher, R. J.; McReak, C. J. (Mem. Hosp. Cancer Allied Dis., New York, N.Y.). *Ann. Surg.* 180 (2):252-253, 1974.

6862 RECONSTRUCTION OF THE PYLORUS FOR POSTVAGOTOMY DIARRHOEA AND DUMPING. *(E.)* Christiansen, P. M.; Hansen, O. H.; Pedersen, T. (Bispebjerg Hosp., Copenhagen, Denmark). *Br. J. Surg.* 61(7):519-520, 1974.

6863 CLINICAL PHYSIOLOGY REVIEW: GASTRIN. *(E.)* Hiatt, G. A.; Wells, R. F. (Brooke Army Med. Ctr., Ft. Sam Houston, Tex.). *Am. J. Gastroenterol.* 62(1):59-66, 1974.

6864 CRITICAL EVALUATION OF OESOPHAGODUODENOSTOMY AFTER TOTAL GASTRECTOMY. *(E.)* Stipa, V.; Bolognese, A.; Di Giorgio, A.; Porena, M. (Surg. Clin. I, Univ. Rome, Italy). *Rend. Gastroenterol.* 5(3):240a, 1973.

6865 A SYSTEM FOR REGISTRATION AND CLASSIFICATION OF THE STOMACH CANCER FOR WHO INTERNATIONAL REFERENCE CENTER. *(E.)* Tsukamoto, K.; Gaitan-Yanguas, M. (Natl. Cancer Ctr., Tokyo, Japan). *Jap. J. Clin. Oncol.* 12(3):117-128, 1973.

6866 GASTRIC MUCOSAL TEARS WITH ACUTE HEMORRHAGE: A POSSIBLE VARIANT OF THE MALLORY-WEISS SYNDROME. *(E.)* Pitman, E. R.; Javdan, P. (Mt. Sinai Hosp. Serv., Elmhurst, N.Y.). *Am. J. Dig. Dis.* 19(8):736-739, 1974.

6867 GASTRIC PHYCOMYCOSIS: REPORT OF A CASE IN MALAYSIA. *(E.)* Ahluwalia, H. S.; Lie, K. J.; Arulambalam, T. R. (Inst. Med. Res., Kuala Lumpur, Malaysia). *J. Trop. Med. Hyg.* 77(5):116-118, 1974.

6868 TRAUMATIC INJURIES OF THE DIAPHRAGM. DIAPHRAGMATIC HERNIA. *(E.)* Grimes, O. F. (Univ. California Med. Ctr., San Francisco). *Am. J. Surg.* 128(2):175-181, 1974.

6869 GASTRIC ABSCESS--A COMPLICATION OF PANCREATITIS. *(E.)* Farman, J.; Dellemand, S.; Rosen, Y. (Dept. Radiol., State Univ. New York, Brooklyn). *Am. J. Dig. Dis.* 19(8):751-758, 1974.

6870 SURGICAL MANAGEMENT OF POSTGASTRECTOMY SYNDROME. *(E.)* Sawyers, J. L. (Vanderbilt Univ. Sch. Med., Nashville, Tenn.). *J. Miss. State Med. Assoc.* 15(7):281-284, 1974.

6871 GASTRIC BIOPSY IN DIAGNOSIS OF INADEQUATE ANTRECTOMY AFTER GASTRIC RESECTION. *(E.)* Speranza, V.; Basso, N. (Inst. Anat. Surg., Univ. Rome, Italy). *Rend. Gastroenterol.* 5(3):240a, 1973.

6872 FUNCTIONAL DIAGNOSIS OF DUMPING SYNDROME. *(Rus.)* Nikitin, V. M.; Mikhailov, V. P.; Kirsanov, B. I. (Yaroslavl Med. Inst., USSR). *Klin. Khir.* (9):72-75, 1973.

6873 CLINICAL SIGNIFICANCE OF THE RESULTS OF DETERMINING PERIPHERAL LEUKOCYTE ALKALINE PHOSPHATASE AND PEROXIDASE ACTIVITIES IN SOME DISEASES OF THE STOMACH. *(Rus.)* Podil'chak, M. D.; Podil'chak, E. M. (L'vov Med. Inst., USSR). *Klin. Khir.* (9):42-44, 1973.

6874 GASTRIC SECRETORY FUNCTION IN EARLY CHILDHOOD IN PATIENTS WITH ALIMENTARY INFECTIOUS ANEMIA. *(Rus.)* Beknazarova, Z. N. (I. P. Pavlov Med. Inst., Samarkand, USSR). *Pediatriia* (5):35-36, 1973.

6875 GASTRIC SYPHILIS. *(Rus.)* Ibadov, A. Iu.; Mukaramov, A. M. (M. I. Kalinin Med. Inst., Andizhan, USSR). *Klin. Khir.* (9):78-79, 1973.

6876 BENIGN GASTRIC TUMORS: FOUR CASES. *(Sp.)* Laranaga Barrera, E.; Candia Sierra, A.; Garcia Ocana, A.; Lopez-Yarto, J. (Gran Hosp. Estado, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 43(2):165-176, 1974.

6877 BENIGN NONEPITHELIAL TUMORS OF THE STOMACH. *(Rus.)* Kal'chenko, I. I.; Khokholia, V. P.; Riabyi, P. A. (Kiev Inst. Postgrad. Med., USSR). *Klin. Khir.* (9):33-38, 1973.

6878 THE STOMACH AS A SITE OF MULTIPLE MYELOMA. *(Fr.)* Bourreille, J.; Hemet, J.; Tayot, J. Maitre, A. M. (Univ. Hosp. Ctr., Rouen, France). *Sem. Hop. Paris* 50(25):1737-1742, 1974.

6879 GASTRIC LYMPHOMA. *(Sp.)* Robayna, G.; de las Casas, P. (no affil.). *Rev. Esp. Enferm. Apar. Dig.* 43(2):213-218, 1974.

6880 NEOPLASTIC DISEASE OF THE STOMACH NOT DUE TO CARCINOMA. *(It.)* Cacciari, C.; Marignani, A.; Malaguti, P. (no affil.). *Boll. Sci. Med.* 145(2):118-124, 1973.

6881 MALIGNANT GASTRIC LYMPHOMAS: STUDY OF A SERIES OF 11 CASES. *(Fr.)* Kayabali, I. (Fac. Med., Ankara, Turkey). *Lyon Chir.* 70(3):285-286, 1974.

6882 OTHER CARCINOEMBRYONIC ANTIGENS. *(Fr.)* Bara, J. (Inst. Sci. Res. Cancer, Villejuif, France). *Bull. Cancer (Paris)* 60(4):421-424, 1973.

6883 LIVER FUNCTION IN OPERATED STOMACH CANCER PATIENTS TRANSFUSED WITH THEIR OWN BLOOD. *(Rus.)* Dedenko, I. K.; Koval'chuk, I. A. (Kadievo Oncol. Dispensary, Voroshilovgrad District, USSR). *Klin. Khir.* (6):28-31, 1973.

6884 A PROPHYLACTIC COURSE OF CHEMOTHERAPY ASSOCIATED WITH HYPERTHERMIA AFTER RADICAL SURGERY FOR STOMACH CANCER. *(Rus.)* Dumbadze, N. D. (Kiev Sci. Res. Inst. Roentgenol. Radiol. Oncol., USSR). *Klin. Khir.* (6):31-34, 1973.

6885 EXPERIMENTAL CLINICAL STUDY ON THE EFFECTIVENESS OF SULFOGLYCOPEPTIDE IN GASTRODUODENAL DISEASE. *(Sp.)* Vera Camba, M.; Villalgordo Aparicio, C.; Guemes Diaz, F.; Arias Vallejo, E. (Hermanos Aznar Outpatient Clin., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 43(2):225-234, 1974.

See also, 6548, 6791, 6795, 6809, 6810, 6812, 6831,
6848, 6852, 6853, 6886, 6888, 6892, 6912,
6942, 7094, 7250, 7332.

STOMACH

Peptic Ulcers

6886 HISTOCHEMICAL CHANGES IN GASTRIC MUCOSUBSTANCES IN PATIENTS WITH ACUTE AND CHRONIC ULCER DISEASE. *(E.)* Cathcart, III, R. S.; Fitts, C. T.; McAlhany, J. C.; Spicer, S. S. (Med. Univ. South Carolina, Charleston). *Ann. Surg.* 180(1):1-8, 1974.

Histochemical changes in gastric mucosubstances were studied in 9 patients with gastric ulcer, 16 with duodenal ulcer, 5 with stress ulcer, and 3 with hemorrhagic gastritis. In 2/3 of the specimens, deep foveolar cells produced a slight to moderate amount of a mucosubstance containing sulfate esters and carboxy roups. Mucous neck cells often produced a neutral ucosubstance, but in 1/3 of the patients they formed light to moderate amounts of sulfated mucosubstances nd possibly also carboxyl groups. Chief cells conained sulfated mucosubstance that stained with aldeyde fuchsin even after exposure to testicular hyalronidase; the zymogen granules had no affinity for ther basic dyes but showed weak periodic acid-Schiff eactivity. Mast cells in the gastric mucosa appeard depleted of mucosubstances when compared with hose in the gastric submucosa or the esophagus. hief cells of patients with stress ulcer or hemorhagic gastritis were consistently depleted of sulated microsubstances. In most cases these patients lso showed depletion of the surface epithelial seretion and the presence of interstitial edema in the uperficial mucosa. These findings are consistent ith the view that biosynthetic activity in chief ells and surface epithelial cells is impaired, peraps secondary to shock-induced circulatory changes, n gastric mucosa of patients with stress ulcer or emorrhagic ulcer.

887 ASSOCIATION BETWEEN THE OCCURRENCE OF PEPTIC ULCERS AND TOBACCO SMOKING. *(E.)*

edrychowski, W.; Popiela, T. (Inst. Soc. Med., Krakw, Poland). *Public Health* 88(4):195-200, 1974.

he number of cigarettes smoked daily, the duration f smoking, and the initiation age were studied mong 4,000 males and females chosen at random to xplain the significance of smoking as an element of xternal environment in the genesis of peptic ulcers. ubjects were divided into 3 principal groups: nonmokers, ex-smokers, and current smokers. The latter roup was further divided into 5 subgroups depending n the number of cigarettes smoked daily (from 4/day o 35/day). Peptic ulcers were diagnosed clinically nd by x-ray examination. The relative risk of a eptic ulcer among males was 5 times higher among mokers or ex-smokers. Multiple regression analysis as used to establish the association between the ccurrence of typical peptic ulcer pain syndromes and he factors mentioned above. It was not determined nequivocally whether smoking is causally related to he occurrence of peptic ulcer. The higher frequency f pain symptoms (34.4%) and diagnosed peptic ulcers (13%) among ex-smokers compared with current smokers (27.9% and 11.2% resp.) could be explained by the act that some smokers who had developed the disease n a more acute form gave up smoking. The findings ndicate that the duration of smoking is a stronger actor contributing to peptic ulcer development than he number of cigarettes actually smoked.

888 THE EFFECT OF CIGARETTE SMOKING ON HUMAN GASTRIC SECRETION. *(E.)*

Whitecross, D. P.; Clarke, A. D.; Piper, D. W. (Dept. Med., Univ. Sydney, Australia). *Scand. J. Gastroenterol.* 9(4): 399-403, 1974.

The effect of cigarette smoking on human gastric secretion was studied in 13 control subjects and 8 patients with chronic peptic ulcer. In 1 of 2 tests on controls, gastric juice was collected in 15-min aliquots during 2 hr of continuous suction. In a study performed on both groups, secretion was collected during a basal hour and during a subsequent hour when the subject smoked 4 cigarettes. Response to smoking was expressed as the ratio of the 2nd basal hr or the smoking hr to the 1st basal hr. Smoking did not influence acid, pepsin, or mucus output in controls or peptic ulcer patients. Tar and nicotine content of the cigarettes had no significant influence on the secretory response. Visual assessment of bile concentrations in controls indicated that smoking increased biliary reflux. These findings contrast with an identical study done 15 yr previously when smoking was found to increase gastric acid secretion. The results do correlate with a recent study in which smoking had no effect on ulcer healing. Biliary reflux may influence the apparent secretory response to smoking, and the effect of smoking on secretion may be obscured by the effect of bile salts on the back diffusion of hydrogen ion

6889 PYLORIC REFLUX: A MODIFICATION OF THE TWO-COMPONENT HYPOTHESIS OF GASTRIC SECRETION.

(E.) Hobsley, M. (Middlesex Hosp., London, England). *Clin. Sci. Mol. Med.* 47(2):131-141, 1974.

Gastric juice was obtained during 2-hr maximal stimulation with histamine (0.13 μM/kg/hr i.v.) in 34 controls, 28 patients with duodenal ulcers, and 18 with gastric ulcers. After correction for pyloric losses, the average rate of outputs of water, H^+, Na^+, K^+, and Cl^- were determined. The duodenal ulcer group secreted significantly more gastric juice with significantly greater outputs of H^+ and Cl^- than controls, while the gastric ulcer group secreted significantly smaller amounts of water and these 2 ions. The average K^+ output in each group closely paralleled the rate of secretion of water in that K^+ concentration was similar in all 3 groups: 17.38 mM/liter in controls, 17.72 mM/liter in the duodenal ulcer group, and 17.52 mM/liter in the gastric ulcer group. The duodenal ulcer patients secreted more Na^+ than controls, in about the same proportion as for water excretion; but the gastric ulcer group secreted even more Na^+ despite the smaller water output. The average Na^+ concentration was 13.7 mM/liter in controls, 14.1 mM/liter in duodenal ulcer patients, and 26.2 mM/liter in gastric ulcer patients. Two-component analysis (acid and alkaline) showed the acid component was similar in duodenal ulcer patients and controls, whereas that in gastric ulcer patients was hypotonic and less acid and contained more Na ions. Neither the acid nor alkaline components of gastric juice of gastric ulcer patients could be described in terms of the 2-component theory. Multiple regression analysis suggested that reflux of alkaline liquid from the duodenum is a better explanation of the results than back diffusion of H^+ in exchange for Na^+ between the lumen and wall of the stomach. Reflux appeared to be more important in the gastric ulcer patients than in the other 2 groups.

6890 VAGOTOMY WITH ANTRUM RESECTION. *(E.)*

Svensson, A. (Gavle Hosp., Sweden). *Acta Chir. Scand.* 140(1):50-56, 1974.

Follow-up studies were conducted on 152 of 154 ulcer patients (124 men and 30 women, average age 47 yr) who had undergone Billroth I resection with vagotomy 7-12 yr earlier. Of the entire series, 120 patients had been treated for duodenal ulcers and 38 for juxta-pyloric ulcers. In all cases, the operative procedure involved excision of 1-2 cm of anterior and posterior vagal trunks below the diaphragm. One patient died of renal failure postoperatively following anastomotic leakage. Causes of the remaining 24 deaths were primarily cardiovascular (13) and malignant disease (6), other than carcinoma of the stomach. There was 1 death due to complications of a 2nd operation for recurrent ulcer and 4 deaths due to alcoholism, bronchopneumonia, or accident. Among the 127 patients who were seen personally or who answered questionnaires, 13 (10.2%) had confirmed recurrent ulceration. Another 13 had symptoms of recurrence but no radiological confirmation. About 3% had severe dumping, as classified by Meurling, and 3.9% had severe diarrhea; both complications were more marked in the 11 patients who underwent further surgery for recurrence. Based on hemoglobin standards of 12.5 g% for men and 11.5 g% for women, 7.7% of men and 11.1% of women were anemic. However, 16% of both sexes were iron deficient on the basis of serum iron values and 21% of the men and 32% of the women were anemic according to values for serum transferrin iron saturation. The Schilling test, performed on 99 patients, showed that 24 patients had pathologic or borderline vitamin B_{12} values. Only 1 of the 24 had uniformly low values for the 3 parameters of anemia. While the results of surgery were satisfactory in 75% of men and 71% of women, the study suggests that vagotomy and antrectomy may not be suitable for routine use in ulcer patients.

6891 THE EFFECT OF EXOGENOUS GASTRIN ON THE ACID SHAM FEEDING RESPONSE IN ANTRUM-BULB-RESECTED DUODENAL ULCER PATIENTS. *(E.)* Knutson, U.; Olbe, L. (Sahlgrenska Hosp., Goteborg, Sweden). *Scand. J. Gastroenterol.* 9(3):231-238, 1974.

Physiological vagal activation of gastric acid secretion by 15-min sham feeding was initiated in 6 duodenal ulcer patients after antrum-bulb resection. The sham feeding tests were performed with and without i.v. infusion of pentagastrin in a just suprathreshold dose (0.5 or 1.6 μg/hr). Four of the patients were sham fed both before and after the antrum-bulb resection. In these patients resection reduced peak acid sham feeding response by 51% and maximal acid response to pentagastrin by 42.2%, the latter suggesting a general and irreversible decline in acid-secreting capacity. After resection pentagastrin had only an additive effect on the acid sham feeding response. The results indicate that in duodenal ulcer patients, the sensitivity of parietal cells to cholinergic direct vagal stimulation is maximally facilitated by endogenous gastrin, or other humoral stimuli, originating outside the antrum-bulb area, in contrast to the analogous condition in the dog. The vagally released gastrin from the antrum-bulb area in the duodenal ulcer patient has only an additive secretory effect on acid secretion induced by physiological vagal activation.

6892 LONG TERM RESULTS OF GASTRECTOMY WITH RESPECT TO BLOOD LIPIDS, BLOOD PRESSURE, WEIG AND LIVING HABITS. *(E.)* Glober, G. A.; Rhoades, G. C.; Liu, F.; Kagan, A. (Japan-Hawaii Cancer Study, Honolulu, Hawaii). *Ann. Surg.* 179(6):896-901, 1974.

A total of 347 Japanese-American men who had undergone partial gastrectomy and 7598 Japanese-American men with no history of gastric surgery were compared with respect to selected physiological variables and living habits. Of the partial gastrectomy group, 33.7% had undergone surgery for duodenal ulcer, 58.2 for gastric ulcer, 4.3% for combined duodenal and gastric ulcer, 3.2% for hemorrhagic gastritis, and i only 0.6% was the diagnosis not established. Gastroduodenal anastomoses were performed in 171 (49%) and gastrojejunal anastomoses in 169 (48.7%); 18.2% had vagotomies as well. The gastrectomy subjects weighe an average of 10.5 pounds less than controls and had lower values for serum cholesterol, triglyceride, an blood pressure. There was a statistically, but not clinically, significant difference in hematocrit between groups; none of the gastrectomy subjects had a hematocrit of less than 35%. The depressed lipid an blood pressure values in the surgical group could no be entirely explained by the reduced weight, nor did the physiological differences appear related to diet or living habits. Total alcohol intake did not diff between groups and, while 61.6% of gastrectomy subje were cigarette smokers compared with 42.6% of contro multivariate analysis showed no direct effect of smo ing. Subjects operated on for gastric ulcer had lower systolic pressures than duodenal ulcer patients, and subjects with gastrojejunal anastomoses had lower cholesterol levels than patients with a gastroduodenostomy. The lower serum cholesterol levels in men with a gastrojejunostomy is suggestive of malabsorption; further, in the absence of dietary differences between groups, the reduced weight in surgical cases could be due to malabsorption. It is postulated that partial gastrectomy patients have a significantly reduced risk of myocardial infarction due to their lower weight, cholesterol, triglycerides, and blood pressure.

6893 CHANGES IN THE VOLUME OF CIRCULATING BLOO IN PATIENTS WITH GASTROINTESTINAL BLEEDING. *(Rus.)* Pavlov, V. V. (Odessa Reg. Clin. Hosp. USSR). *Vestn. Khir.* 111(10):12-15, 1973.

Changes in the circulating blood volume were measure by Metholf and Rousellot's dextran technique, the Evan's blue method, and the ^{131}I-labeled albumin met od in 109 patients (85 men and 24 women) hospitalize for acute gastrointestinal bleeding. Bleeding was due to duodenal ulcer in 54 cases, gastric ulcer in 16, erosive gastritis in 17, gastric cancer in 10, portal hypertension in 6, and other causes in 6. Th ^{131}I-labeled albumin technique gave the most accurat information on the circulating blood volume. There was a pronounced circulatory insufficiency in 67 patients admitted within the first 24 hr after onset o bleeding. The volume of circulating blood ranged from 500 to 2000 ml, i.e. from 10 to 40% of normal values. Specific gravity determinations performed on their blood demonstrated that the decrease in cir

ılating blood volume occurred primarily because of
decrease in the red cell volume which accounted
or 65% of the blood loss. Within 24-48 hr after
leeding, hemoglobin values and the RBC decreased
hile the circulating blood volume increased due
o an increase in the plasma volume. The con-
ition of the patient did not always depend on the
mount of blood lost. Collapse, systolic pressures
f 80-85 mm Hg, and weak and unsteady pulses were ob-
erved in 6 patients with little blood loss, while
ome patients who had lost more than 1000 ml had few
linical abnormalities. When transfusions were ad-
inistered, the circulating blood volume did not al-
ays show a corresponding increase. In 56 patients
ropwise i.v. infusion of whole blood increased the
irculating blood volume by only 70% of the volume
f blood administered, while bolus injections of
lood in 36 patients increased circulating blood vol-
mes to 120% of the volume of blood administered.
n both groups of patients increases in the circu-
ating blood volume occurred primarily because of in-
reases in the red cell volume, probably since plas-
a does not remain in the blood stream for a long
ime. Of the 190 patients, 73 (66.1%) responded to
onservative therapy, while 36 (32.9%) had to under-
o surgery. In 29 cases, surgery was delayed for 2-
weeks after bleeding stopped and the circulating
lood volume had returned to normal. Good results
ave recently been obtained by using selective ab-
ominal hypothermia.

894 MEDIUM-TERM FUNCTIONAL AND HISTOLOGICAL
FOLLOW-UP EXAMINATIONS AFTER SELECTIVE
ASTRIC VAGOTOMY. *(Ger.)* Rehner, M.; Soehendra, N.;
itschke, H. (Surg. Clin., Univ. Hamburg, Germany).
tsch. Med. Wochenschr. 98(51):2440-2442, 1973.

ive-yr follow-up examinations were performed on 23
atients who had undergone bilateral selective gast-
ic vagotomy combined with Heineke-Mikulicz pylorop-
asty (16 cases) or a Jaboulay side-to-side gastro-
uodenostomy (7 cases) for duodenal ulcers. Histo-
ogical examination of biopsies taken from the antrum
howed superficial gastritis in 10 cases, superficial
astritis and partial atrophy in 4, and chronic atroph-
c gastritis in 9. Material taken from the corpus
xhibited superficial gastritis in 9 cases, superfi-
ial gastritis with partial atrophy in 4, and chronic
trophic gastritis in only 3 cases. The incidence of
hese changes was about the same as that found in a
ollow-up examination made 1 yr after surgery. After
yloroplasty the pylorus remained wide open and, in
ome cases, slight reflux occurred. With pentagastrin
timulation, acid outputs ranged from 0 to 19.7 mEq/hr
mean 5.6 ± 5.1 mEq/hr) 5 yr after vagotomy. The
uthors conclude that the mucosa undergoes more favor-
ble changes after selective gastric vagotomy than
fter various forms of resection; however, they studied
o patients who had only selective vagotomy or only
arious forms of resection.

895 THE EFFECT OF VAGOTOMY WITH PROCEDURES FA-
CILITATING GASTRIC DRAINAGE ON THE MOTILITY
F BILE DUCTS. *(Pol.)* Dacka, E.; Smajkiewicz, L.
Med. Acad., Lublin, Poland). *Pol. Przegl. Chir.* 45
12):1427-1430, 1973.

Thirty duodenal ulcer patients were examined 3-5 years after having undergone complete vagotomy and one of the procedures facilitating gastric drainage (antrectomy with Rydygier's gastroenterostomy in 10, Reichel-Polya-Finsterer's procedure in 15, pyloroplasty in 3, and gastro-intestinal anastomosis in 2). Cholangiocholecystography was performed on all. In 23 patients a normal radiologic picture of the bile ducts was obtained. After functional tests, the gallbladder contracted to 1/3 of initial size in 22 patients; somewhat weaker gallbladder contractions were noted in only 1 case. An abnormal radiologic picture was obtained in 7 of the 30 patients (23.3%). In 3 cases the gallbladder was large and had lost the ability to contract after ingestion of egg yolks, but the common bile duct and passage of bile into the duodenum were normal. In 4 of the 7 patients the common bile duct was markedly enlarged, while the gallbladder was of normal size and reacted normally to contraction producing stimuli. None of the patients had cholelithiasis. It was concluded that these changes were permanent.

6896 THE "IN SITU" GASTRIC pH IN PRE- AND POST-OPERATIVE INVESTIGATIONS OF PEPTIC ULCER: STUDY OF 206 EXAMINATIONS. *(Fr.)* Boury, G.; Mathey, J. C.; Houdard, C. (Tenon Hosp., Paris, France). *Arch. Fr. Mal. App. Dig.* 63(3):213-222, 1974.

Measurements of the pH of the gastric mucosa were made before and after surgery on 157 patients with gastric or duodenal ulcers and on 15 controls with no evidence of esophageal, gastric, or duodenal disease. The mean age and sex ratios were similar in the 3 groups studied. In 80 patients with duodenal ulcers, the mean intragastric pH before surgery was significantly lower (1.4 ± 0.18) than that found in the controls (1.8 ± 0.2). However, because of dispersion of the results, measurement of the intragastric pH cannot be regarded as a reliable method for diagnosing duodenal ulcers. Before surgery, intragastric pH values in 22 patients with gastric ulcers (1.6 ± 0.2) were intermediate between those in patients with duodenal ulcers and the control group. Surprising little change in the pH occurred after gastroenterostomy alone (1.7 ± 0.4). After gastroenterostomy associated with vagotomy, the postoperative intragastric pH averaged 2.2 ± 1.2. Much larger changes in the intragastric pH were observed after surgery in patients who underwent extensive gastrectomy (5.1 ± 1.4) or antrectomy associated with vagotomy (4.0 ± 1.2). On the basis of these findings and other data in the literature, antrectomy associated with vagotomy is recommended for the treatment of duodenal ulcer since it causes a significant and consistent decrease in gastric acidity and is not accompanied by the sequelae associated with extensive gastrectomy.

6897 BLEEDING DUODENAL ULCER CONTROL. SELECTIVE ARTERIAL EMBOLIZATION WITH AUTOLOGOUS BLOOD CLOT. *(E.)* White, Jr., R. I.; Giargiana, Jr., F. A.; Bell, W. (Johns Hopkins Med. Inst., Baltimore, Md.). *J.A.M.A.* 229(5):546-548, 1974.

6898 GASTRIC EMPTYING AFTER TRUNCAL VAGOTOMY OR HIGHLY SELECTIVE VAGOTOMY. *(E.)* Duthie, H.; Howlett, P.; Ward, A. (Univ. Dept. Surg., Sheffield, England). *Digestion* 10(3):218, 1974.

6899 PEPTIC ULCERATION, ACUTE PANCREATITIS AND SEVERE HYPOCALCAEMIA TWO YEARS AFTER PARATHYROID ADENECTOMY. *(E.)* Walton, R. J. (Radcliffe Infirm., Oxford, England). *Br. J. Clin. Pract.* 28 (7):263, 1974.

6900 GASTRIC ACID AND PLASMA GASTRIN RESPONSES TO SHAM FEEDING IN DUODENAL ULCER PATIENTS BEFORE AND AFTER RESECTION OF ANTRUM AND DUODENAL BULB. *(E.)* Knutson, U.; Olbe, L.; Ganguli, P. C. (Sahlgrenska Hosp., Goteborg, Sweden). *Scand. J. Gastroenterol.* 9(4):351-356, 1974.

6901 THE EFFECT OF INTRAGASTRIC pH VARIATIONS ON THE GASTRIC ACID RESPONSE TO SHAM FEEDING IN DUODENAL ULCER PATIENTS. *(E.)* Knutson, U.; Bergegardh, S.; Olbe, L. (Sahlgrenska Hosp., Goteborg, Sweden). *Scand. J. Gastroenterol.* 9(4):357-365, 1974.

6902 PATHOGENESIS OF PEPTIC ULCER. *(E.)* Ivey, K. J. (Roy. Prince Alfred Hosp., Camperdown, Australia). *Aust. NZ J. Surg.* 4(1):71-74, 1974.

6903 VITAMIN B$_{12}$ AND FOLIC ACID STATUS AFTER VAGOTOMY DRAINAGE PROCEDURES. *(E.)* Duraiappah, B.; Streeter, A. M.; Gillett, D. J.; Pheils, M. T. (Repatriation Gen. Hosp., Concord, Australia). *Aust. NZ J. Surg.* 44(1):74-75, 1974.

6904 CLINICAL AND MORPHOLOGICAL FEATURES OF THE JEJUNAL MUCOSA AFTER GASTRIC RESECTION FOR PEPTIC ULCER DISEASE. *(Rus.)* Mikita, A. I. (Dept. Gen. Hosp. Surg., Uzhgorod Univ., USSR). *Klin. Khir.* (9):24-28, 1973.

6905 STUDIES OF THE FIBRINOLYTIC SYSTEM IN PATIENTS WITH ACTIVE PEPTIC ULCERS. *(Ger.)* Kovacs, E.; Sudar, G.; Mesko, K. (Janos Balassa Reg. Hosp., Szekszard, Hungary). *Dtsch. Gesundheitsw.* 29(3):105-109, 1974.

6906 GASTROINTESTINAL ULCERS CAUSED BY HYPOXIA. *(Rus.)* Voinovskaia, E. A.; Meizer, V. A. (Izmail Munic. Hosp., USSR). *Klin. Khir.* (11):76-77, 1973.

6907 PREPARATION OF PATIENTS FOR GASTRIC RESECTION ON THE BASIS OF THEIR GASTRIC MOTILITY AND SECRETION. *(Rus.)* Ogii, P. E.; Khoromskii, L. N.; Kit, O. N.; Koval'chuk, A. A. (Ternopol Med. Inst., USSR). *Klin. Khir.* (9):10-13, 1973.

6908 GASTRECTOMY AND PHYSICAL HANDICAPS: STUDY OF 110 SUBJECTS AT WORK. *(Fr.)* Miroux, M. (no affil.). *Cah. Med. Interprof.* (49):29-49, 1973.

6909 ELECTROLYTES IN THE GASTRIC CONTENTS AFTER SELECTIVE VAGOTOMY AND PYLOROPLASTY FOR PEPTIC ULCER. *(Rus.)* Kataeva, G. A.; Zhupan, B. F.; Mikhailova, E. N.; Satsukevich, V. N. (S. M. Kirov Milit. Med. Acad., Leningrad, USSR). *Klin. Khir.* (9):7-10, 1973.

6910 POST OPERATIVE FOLLOW-UP OF TRUNCAL VAGOTOMY BY ELECTROGASTROENTEROGRAPHY. *(Fr.)* Murat, J.; Bertrand, J.; Crassas, Y.; Martin, H.; Thillier, J. L. (Central Hosp. Bretonneau, Tours, France). *Chirurgie* 99(10):701-710, 1973.

6911 SEQUELAE OF TYPICAL GASTRIC RESECTIONS FOR PEPTIC ULCER. *(Rus.)* D'iachenko, P. K.; Mazurik, M. F.; Trostian, A. N.; Lysak, Z. A. (Poltava Inst. Med. Stomatol., USSR). *Klin. Khir.* (11): 63-67, 1973.

See also, 6810, 6853, 6859, 6873, 6942.

SMALL INTESTINE

6912 SMALL INTESTINAL BACTERIAL FLORA IN DERMATITIS HERPETIFORMIS. *(E.)* Heading, R. C.; Parkin, D. M.; Barnetson, R. St. C.; McClelland, D. B. L.; Shearman, D. J. C. (Dept. Therap., Univ. Edinburgh, Scotland). *Am. J. Dig. Dis.* 19(8): 704-708, 1974.

Cultures of jejunal aspirates from 22 patients (aged 25-73 yr) with dermatitis herpetiformis gave bacterial counts of more than 10^6/ml in 11 cases. Of the 22 patients, 12 had an impaired capacity to secrete gastric acid. This may be a further aspect of the many ways in which dermatitis herpetiformis resembles celiac disease. Similar bacteriological profiles were found in the jejunum of the 12 subjects with impaired gastric acid secretion and controls with similarly impaired gastric acid secretion. Thus, colonization of the small intestine in dermatitis herpetiformis is not a primary feature of the condition itself, but can be attributed to the frequently associated impairment of gastric acid secretion. An attempt was made to identify a relation between the flora in patients with dermatitis herpetiformis and the concentration of IgA and IgM in their jejunal aspirates. No evidence for a direct relation was found. Combination of data from patients with hypochlorhydria and those with achlorhydria suggests that the number of organisms may be reciprocally related to both the IgA and IgM concentrations, but the number of patients is too small for this to be statistically substantiated.

6913 MICROBIAL FLORA AND DISACCHARIDASE DEPRESSION IN INFANTILE GASTROENTERITIS. *(E.)*

Barnes, G. L.; Bishop, R. F.; Townley, R. R. W. (Dept. Pediatr., Univ. Melbourne, Victoria, Australia). *Acta Paediatr. Scand.* 63(3):423-426, 1974.

Duodenal disaccharidase activity was studied in 31 infants (22 males and 9 females less than 1 yr) with acute gastroenteritis and normal duodenal mucosal histology. Maltase, sucrase, and lactase levels were compared with normal values of 9.0, 3.5, and 1.1 U/g wet weight, resp., and disaccharidase depression was assumed if levels of at least 2 enzymes were below these norms. Such depression was found in 18 patients, 8 of whom grew *Candida albicans* in abundance in the duodenum. Of the 13 patients with normal disaccharidase activity, only 1 grew *C. albicans* in large numbers. Analysis of individual enzyme levels showed a statistically significant association between lactase depression and growth of *C. albicans*. The incidence of *Escherichia coli* in infants with abnormal disaccharidase levels was the same as in infants with normal enzyme activity. A possible explanation for the association between *C. albicans* and disaccharidase activity is that growth of yeast in the gut lumen reduces enzyme activity at the same level. *C. albicans* strains isolated from infants with gastroenteritis significantly depressed lactase activity when injected into isolated loops of small bowel of infant rabbits.

6914 EFFECT OF SYSTEMIC INFECTIONS ON GLYCYLGLYCINE ABSORPTION RATE FROM THE HUMAN JEJUNUM IN VIVO. *(E.)*

Cook, G. C. (Dept. Med., Univ. Zambia, Lusaka). *Br. J. Nutr.* 32(1):163-167, 1974.

Using a double-lumen tube jejunal perfusion system, the rate of glycine absorption from a glycylglycine solution (50 mM/liter) was measured in 3 groups of Zambian African subjects. In 15 of the subjects (aged 18-61 yr) there was no evidence of infection; 11 subjects (22-58 yr of age) had acute infections and 5 subjects (aged 21-48 yr) had chronic infections. None of these patients had clinical evidence of malnutrition or gastrointestinal disease. Mean glycine absorption rates for the normal group, those with acute infection, and those with chronic systemic infections were 65.7, 60.6, and 68.0 mg/min per 300 mm jejunum, resp. These differences were not significant. Differences in net water transfer from the glycylglycine solution were likewise not significant. Correlation between the glycine absorption rate in individuals and age, body weight, serum albumin, hemoglobin, total globulin, γ-globulin, and the site of the infusion were not significant. These results support earlier findings that, in man, absorption rates of glycine and glycylglycine are influenced differently by acute bacterial infections. These findings provide further evidence that amino acids and peptides use separate transfer mechanisms. It is suggested that protein supplements may be more rapidly absorbed when given as free amino acids than when given as peptides in subjects with acute systemic bacterial infections.

6915 DRUG-INDUCED ENTEROPATHY CHARACTERIZED BY LIPID IN MACROPHAGES. *(E.)*

Gray, J. E.; Weaver, R. N.; Sinkula, A. A.; Schurr, P. E.; Moran, J. (Res. Div., Upjohn Co., Kalamazoo, Mich.). *Toxicol. Appl. Pharmacol.* 27(1):145-157, 1974.

Groups of 10 male Sprague-Dawley rats were treated p.o. for 1 week with the synthetic 2'-dodecyl glutaramide ester of erythromycin. Rats given 1000 mg/kg/day ate about 1/2 of normal food consumption and showed essentially no growth. Weight gains of rats given 300 and 500 mg/kg were proportionally less affected. No gross lesions were observed. Lipid droplets accumulated in macrophages and in the lamina propria of the small intestine and in the sinusoids of the mesenteric lymph nodes, in Kupffer cells in the liver, and in fixed macrophages in the spleen. In fixed frozen sections, these droplets stained well with Oil Red O. Toluidine blue-stained epoxy sections were most useful in studying the distribution of the droplets. Paraffin sections showed no evidence of acid-fastness or autofluorescence. The droplets resembled neutral lipid under electron microscopic examination. They appeared to undergo a gradual membranous degradation at their surface; most of the droplets had disappeared at 3 weeks post-treatment. Small aggregated myeloid figures were also present in the cells of the lamina propria of the small intestine and occasionally in the absorptive cells. Parallel studies with erythromycin base (659 mg/kg) and the 2'-dodecyl glutaramide moiety (342 mg/kg) did not produce the lipid accumulation in macrophages. From these results, it was concluded that the ester was absorbed unhydrolyzed and converted rapidly to a chylomicron-like droplet. The reduction of p.o. D-xylose in urine to about 1/4 of that in control rats was suggestive of malabsorption. Steatorrhea could not be confirmed by fecal lipid analyses due to the lipid structure of the ester.

6916 MORPHOLOGY, DIPEPTIDASES AND DISACCHARIDASES OF SMALL INTESTINAL MUCOSA IN CHRONIC RENAL FAILURE. *(E.)*

Denneberg, T.; Lindberg, T.; Berg, N. O.; Dahlquist, A. (Malmo Gen. Hosp., Sweden). *Acta Med. Scand.* 195:465-470, 1974.

Small intestinal function was studied in 29 patients (13 women and 16 men, aged 19-69 yr) with chronic renal failure. Of these patients, 18 were on regular hemodialysis, 9 had uremia, and 2 a nephrotic syndrome. Morphologic examination of 19 small intestinal biopsies showed pronounced changes in 6 patients (ridging, crypt elongation, and heavy plasma cell infiltration) but only slight changes in the others. Enzyme activity was more affected than the morphology of the intestinal mucosa. Fourteen biopsies had decreased sucrase and maltase activity and 10 had low glycyl-L-leucine and L-alanyl L-proline dipeptidase activities. Only 2 patients had normal dipeptidase and disaccharidase activities. Pancreatic function, tested in 5 patients, was normal. The dysfunction of the small intestine was also reflected in the increased fecal fat excretion in 4 of 14 patients tested, low serum folate in 8 of 20 (before dialysis), and general flattening of the glucose tolerance curve in dialysis and uremic patients. The reduced sucrase and maltase activity may create gastrointestinal difficulties with carbohydrate-rich diets, but the depression of dipeptidase activity was not great enough to interfere with peptide absorption. The 2 patients with nephrotic syndrome had normal morphology in biopsy specimens and practically normal enzyme activities. No characteristic finding was registered for other renal diseases, although both biopsied patients with Alport's syndrome had a distinct increase of plasma cells and elongation of crypts. The finding of uremic enteropathy in most of these patients suggests that the entire gastrointestinal tract is involved in chronic renal failure.

6917 INFLAMMATORY PSEUDOTUMOR OF THE SMALL INTESTINE. *(E.)* Campbell, W. L.; Green, W. M.; Seaman, W. B. (Coll. Physicians Surg., New York, N.Y.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(2):305-311, 1974.

Case reports are presented for 6 patients (3 women and 3 men, aged 49-62 yr) with inflammatory pseudotumor of the small intestine. Roentgenographically, the lesion was a submucosal mass localized in the 1st portion of the duodenum in 1 patient, in the duodenal bulb on old duodenal ulcer scars in 2, and in the ileum in 3. The ileal pseudotumors intussuscepted and caused obstruction, with the lumen almost obliterated in 1 case. Mass size ranged from less than 1 cm in diameter to 4.5 X 11 cm. Large inflammatory pseudotumors simulated benign neoplasms. Histologically, the submucosal masses were characterized by inflamed granulation tissue with variable numbers of eosinophils; some lesions had virtually no eosinophils. In contrast to eosinophilic gastroenteritis, inflammatory pseudotumor is a well-defined lesion and is not associated with clinical allergies and increased numbers of blood eosinophils.

6918 NEOPLASMS OF THE SMALL BOWEL. *(E.)* Silberman, H.; Crichlow, R. W.; Caplan, H. S. (USAF Med. Ctr., Scott AFB, Ill.). *Ann. Surg.* 180(2):157-161, 1974.

Thirty-two malignant and 34 benign neoplasms of the small intestine were diagnosed over a 20-yr period. Patients with malignant lesions averaged 56.8 yr at diagnosis compared with 62.2 yr for patients with benign lesions. Malignant lesions were divided equally between men and women, but 23 of the 34 benign lesions were in men. Nearly all (30) of the 32 patients with malignancies were symptomatic, whereas in 1/2 of the patients with benign lesions the condition was an incidental finding. The most common symptoms of small bowel malignancy were weight loss (17 cases), pain (15 cases), anemia (13 cases), nausea (11 cases), and palpable mass (7 cases). Among symptomatic patients with benign tumors, pain occurred in 14 and rectal bleeding in 10. Small-bowel radiography was the most useful diagnostic aid. Histologically, the malignant tumors were adenocarcinoma (19), carcinoid (8), leiomyosarcoma (4), and lymphosarcoma (1). Over 1/2 the adenocarcinomas were duodenal and 3/4 of the carcinoids were located in the ileum. Nine types of benign lesions were identified, but leiomyomas and benign carcinoids accounted for 1/3 of the lesions. Of the 10 benign carcinoids, 9 were in the ileum. Thirteen patients, including 7 with carcinoid tumors, had 14 other primary tumors outside the bowel. Resection in 25 of 32 cases of malignant tumors resulted in eight 5-yr survivals. These survivors included 3 with adenocarcinoma, 3 with malignant carcinoid, and 1 each with leiomyosarcoma and lymphosarcoma.

6919 PRIMARY MALIGNANCIES OF THE SMALL BOWEL: A REPORT OF 96 CASES AND REVIEW OF THE LITERATURE. *(E.)* Wilson, J. M.; Melvin, D. B.; Gray, G. F.; Thorbjarnarson, B. (N. Y. Hosp.-Cornell Med. Ctr., New York, N.Y.). *Ann. Surg.* 180(2):175-179, 1974.

The clinical records and histological sections of 96 patients (51 men and 45 women, aged 31-84 yr) with primary small bowel malignancies were reviewed for the period 1932-1972. There were 48 adenocarcinomas, 37 carcinoids, and 11 leiomyosarcomas. The peak incidence of adenocarcinoma was in the 7th decade while the other 2 types of tumors were more common in the 6th decade. Only 7 malignant small intestinal tumors occurred in patients younger than 30 yr. The average duration of symptoms was 6 months for adenocarcinoma, 8 months for leiomyosarcomas, and 12 months for carcinoids. The most common presentation was pain (33%) followed by weight loss (23%), obstruction (16%), hemorrhage (15%), jaundice (5%), intussusception (3%), and perforation (3%). Masses were felt in 30% of the cases but were usually dilated bowel or intussusception rather than the tumor *per se*. Eighty-four patients (88%) had symptoms leading to an operative diagnosis, and curative resection was attempted in 80 of these; 12 carcinoids were diagnosed at autopsy. Of the 48 patients with carcinoma, 6 (15%) were alive after 5 yr. Three of these had pancreatico duodenectomy for duodenal tumors, and 3 had wide excision of jejunal lesions. Seven of the 37 patients with carcinoids and 2 of 11 with leiomyosarcomas were alive at 5 yr. The 80% mortality among patients followed for 5 yr is attributed to the late appearance of symptoms and anatomic obstacles to a truly radical operation. In the case of adenocarcinomas and carcinoids, such an operation would require sacrifice of nearly all the small intestine and proximal colon.

6920 PERFORATED DIVERTICULITIS OF THE TERMINAL ILEUM. *(E.)* Ackerman, N. B. (Menorah Med. Ctr., Kansas City, Mo.). *Am. J. Surg.* 128(3):426-428, 1974.

erforated diverticulitis of the terminal ileum was
ocumented in a 63-yr-old woman who presented with
cute abdominal pain, nausea, and lower abdominal
enderness. The blood cell count on admission in-
luded a hemoglobin of 11.4 g% and a WBC of 5800/mm^3
ith 74% polymorphonuclear leukocytes. Over the next
ew days the WBC rose to 10,400/mm^3 with 81% poly-
orphonuclear leukocytes. Since the patient's his-
ory included an appendectomy and a barium study sug-
esting diverticular disease of the descending colon,
he preoperative diagnosis was diverticulitis of the
igmoid colon. However, laparatomy revealed a hard
odular mass that involved the terminal ileum, cecum,
nd mesentery. Primary resection with ileotransverse
olostomy was performed because malignancy was sus-
ected. The surgical specimen showed multiple diver-
icula in the terminal ileum, with a large walled-off
bscess communicating with 1 perforated diverticulum.
he diverticula were all located on the mesenteric
order. The patient died on the 8th postoperative
ay from cardiopulmonary disease. At autopsy multiple
iverticula of the jejunum and remaining ileum were
ound along the line of mesenteric attachment; no
iverticula were seen in the large intestine. Of the
previous cases of perforated diverticula of the
erminal ileum reported in the English literature,
he patient died postoperatively, presumably from
verwhelming sepsis. Two developed postoperative
omplications consisting of a wound infection and
istula in 1 and a pelvic abscess in the other. Al-
hough rare, perforated diverticulitis of the terminal
leum should be considered when a patient presents
ith an ileocecal mass at operation. Primary resec-
ion with ileotransverse colostomy is probably the
reatment of choice although associated with a signi-
icant mortality and morbidity.

921 INTRALUMINAL DUODENAL DIVERTICULUM. *(E.)*

Yang, T. S.; Greenspan, A.; Farber, M.;
ichter, R. M.; Bryk, D.; Levowitz, B. S. (Jewish
osp. Med. Ctr., Brooklyn, N. Y.). *Arch. Surg.* 109
l):113-115, 1974.

ntraluminal duodenal diverticulum was diagnosed pre-
peratively by roentgenographic study in a 45-yr-old
oman with a 6-month history of intermittent gastric
ain and fullness. Roentgenographic findings were
hose of an elongated barium collection entirely
ithin the duodenal lumen, surrounded by a narrow
adiolucent line. By abolishing peristalsis, hypo-
onic duodenography (60 mg propantheline bromide i.m.)
emonstrated the radiolucent septum traversing the
uodenal lumen as the basic abnormality. The diver-
icular wall was excised through a duodenotomy, with
losure of the mucosal defect by direct approxima-
ion. Injury of the common bile duct was avoided
 inserting a probe *via* a choledochtomy incision
hrough the papilla of Vater prior to excision. It
s suggested that intraluminal duodenal diverticulum
s caused by incomplete recanalization of the embry-
nic duodenal lumen after its obliteration by epi-
helial cell proliferation. In the event of faulty
ecanalization, a diaphragm results that may vary
rom a completely obstructing imperforate web to a
mall membrane attached along a short portion of the
uodenal circumference. Such a membrane may flatten
out against the duodenal wall when subjected to continual peristalsis, or similarly elongate and produce the type of diverticulum reported in this patient. If the duodenum is obstructed and duodenojejunostomy is elected, care must be taken in the choice of the site for the duodenal opening. In adults with longstanding duodenal obstruction and dilation, proximal diversion may be preferable to excision of the diaphragm. When the duodenum fails to recover its tone and normal peristaltic ability after decompression, gastrojejunostomy or Billroth II gastric resection may give relief if biliary and pancreatic secretions enter the duodenum distal to the level of obstruction. If the papilla of Vater is proximal to the obstruction, direct excision of the membrane is the only alternative.

6922 VALUE OF SELECTIVE AND TRUNCAL VAGOTOMY IN MASSIVE BOWEL RESECTION. *(E.)*

Albo, R. J.; Angotti, D.; Sorensen, D.; Michaels, T. A. (Highland Gen. Hosp., Oakland, Calif.). *Am. J. Surg.* 128(2): 234-242, 1974.

To determine whether vagotomy would decrease the high mortality after massive bowel resection and to clarify whether preservation of the vagal branches to the liver, pancreas, and small bowel (selective vagotomy) would enhance the survival and produce an anabolic effect, selective vagotomy and pyloroplasty was compared with truncal vagotomy and pyloroplasty in mongrel dogs subjected to massive bowel resection. Alterations in absorption of ingested proteins, carbohydrates, and fat and changes in intestinal transit time were studied as possible means for showing the effects of vagotomy. Selective and truncal vagotomy and pyloroplasty increased the survival time and decreased the percent of daily weight loss in the dogs when compared with massive bowel resection only. No significant difference in survival time was noted between selective vagotomy and truncal vagotomy. Vagotomy and pyloroplasty also increased the absorption of nitrogen and fat and lengthened the transit time when compared with massive bowel resection only, but an anabolic state was not created and the operative procedure did not represent the entire solution for a patient with massive bowel resection. It is suggested that the adjunctive procedure be delayed until after a period of observation with good medical management had been determined to be unsuccessful.

6923 CURRENT ASPECTS OF INTESTINAL TUBERCULOSIS: REVIEW OF 12 CASES AND THE RECENT LITERATURE. *(Fr.)*

Legre, M.; Boucher, J. (Hopital de la Conception, Marseille, France). *Ann. Gastroenterol. Hepatol. (Paris)* 9(5):435-455, 1973.

On the basis of 720 cases reported in the literature since 1960 and 12 of their own cases, the authors propose a system for classifying intestinal tuberculosis into 3 groups. These consist of (1) early primary, or apparently primary forms which most often respond to drug therapy; (2) late forms which are generally sequelae and must often be treated surgically because of mechanical complications; and (3) classical forms secondary to pulmonary tuberculosis which have developed recently and are progressive in nature. Of the authors' 12 patients (7 women and 5 men, aged 25-75 yr), 5 belonged to group (1). The principle problem in this group was of establishing a differential diagnosis between intestinal tuberculosis and Crohn's disease. Pulmonary tuberculosis was diagnosed in 3 of these 5 patients. Drug treatment was successful in 3 cases, but 1 patient developed a pulmonary and peritoneal recurrence 4 yr later. Right hemicolectomies were performed on the remaining 2 patients who were then given antibiotics. Of the 5 patients in group (2), 4 had histories of pulmonary tuberculosis and 1 had undergone an appendectomy 13 yr previously when tubercular lesions were found. A right hemicolectomy was performed on 1 of these 5 patients. Of the 2 patients in group (3), both had histories of pulmonary tuberculosis; 1 patient died.

6924 GASTROINTESTINAL MANIFESTATIONS OF URTICARIA PIGMENTOSA. *(Fr.)* Debray, C.; Leymarios, J.; Cerf, M.; Marche, C.; Bocquet, L. (Bichat Hosp., Paris France). *Ann. Med. Interne (Paris)* 124(12):927-930, 1973.

A 46-yr-old man with a 2-yr history of diarrhea and Darier's sign presented with hepatosplenomegaly. A diagnosis of urticaria pigmentosa was confirmed by a skin biopsy. At laparoscopy, diffuse hepatic hypertrophy was seen with no evidence of nodules, but liver function tests were normal. Radiological examinations showed many round, clearly defined filling defects in the duodenal bulb with a few small ones in the colon and stomach; the jejunal folds were thickened. Other findings included decreased IgA levels in jejunal fluid and saliva, bone condensation, anemia, and mast cells in a bone marrow biopsy. Biological tests for intestinal malabsorption were negative, and jejunal lactase activity was within normal limits. Microscopic examination of jejunal biopsies revealed partial or subtotal villous atrophy with moderate fibrosis and infiltrates of lymphocytes, plasma cells, and polynuclear eosinophils in the lamina propria; the number of mast cells was normal. Ultrastructural examinations of the jejunum showed epithelial damage, particularly to microvilli in villous enterocytes, and membrane degradation in the cytoplasm of plasma cells. At autopsy, 2 yr after the initial hospitalization, mast cell proliferation was found in the heart, abdominal lymph nodes, bone marrow, spleen, and liver. Except for a polyadenoma of the colon, no mast cell proliferation was observed in the intestinal mucosa.

6925 SUBCLINICAL OR MASKED CASES OF CHRONIC MESENTERIC ISCHEMIA. *(Fr.)* Patrassi, G.; Zuin, R. (Med. Clin., Univ. Padua, Italy). *Ann. Gastroenterol. Hepatol.* 9(3):223-235, 1973.

Chronic mesenteric ischemia in 2 patients was diagnosed by aortography. A 30-yr-old man with a history of myocardial infarction developed episodes of abdominal pain which were alleviated only by fasting for 24-48 hr. The patient was variously diagnosed as having spastic colitis, irritable colon, and a gastric ulcer and lost 22 kg in about 1 yr. Abdominal aortography showed obstruction of the celiac trunk and superior mesentery and very slight stenosis of the right common iliac artery. Good results were obtained with a superior aortomesenteric bypass and reversal of a segment of the great saphenous vein. A 62-yr-old alcoholic with a 9-yr history of mild diabetes mellitus developed episodes of abdominal pain lasting 10-15 min which often occurred after he had eaten cold food. He developed steatorrhe and progressive weight loss. Liver biopsies showed associated cirrhotic perihepatitis, and radiological examinations demonstrated calcification of the pancreas and abdominal aorta. Aortography demonstrated annular retraction of the gastrohepatic artery and a pronounced reduction in the diameter of the superior mesenteric artery with Riolan's arch originating in the inferior mesenteric artery. The slow course of the disease in this case suggests that arterial disease was an important factor in the development of chronic pancreatitis and diabetes. If pancreatitis had produced the arterial obstruction, arteria changes would have been more localized. It is recommended that aortography be used for patients with chronic pancreatitis, especially when no convincing cause for the pancreatitis can be established.

6926 JEJUNAL MUCOSAL RECOVERY IN COELIAC DISEASE IN RELATION TO THE DEGREE OF ADHERENCE TO A GLUTEN-FREE DIET. *(E.)* Dissanayake, A. S.; Truelove, S. C.; Whitehead, R. (Radcliffe Infirm., Oxford, England). *Q. J. Med.* 43(170):161-185, 1974.

6927 INTERNAL HERNIATION OF THE SMALL BOWEL AFT GASTRO-ENTEROSTOMY. *(E.)* Gupta, S.; Rao, T. R. G. (Inst. Med. Sci., Banaras Hindu Univ., Varanasi, India). *Aust. NZ J. Surg.* 44(1):43-45, 1974.

6928 CANCER OF THE GASTROINTESTINAL TRACT. E. SMALL INTESTINE: DIAGNOSIS AND TREATMENT INTRODUCTION. *(E.)* Rubin, P. (Strong Mem. Hosp., Rochester, N.Y.). *J.A.M.A.* 229(6):699, 1974.

6929 MALIGNANT TUMORS OF THE SMALL INTESTINE. *(E.)* Kyriakos, M. (Washington Univ. Sch. Med., St. Louis, Mo.). *J.A.M.A.* 229(6):700-702, 1974.

6930 PRIMARY TUMORS OF THE SMALL INTESTINE. *(E.)* Vilinskas, J.; Roberts, M. P. (VA Hosp., Newington, Conn.). *J. Abdom. Surg.* 16(7): 176-178, 1974.

6931 ACRODERMATITIS ENTEROPATHICA, WITH PATHOLOGIC FINDINGS IN JEJUNUM AND SKIN. *(E.)* Rayhanzadeh, S.; Dantzig, P. (Albany Med. Coll., N.Y.). *Pediatrics* 54(1):77-80, 1974.

6932 COMPLICATIONS OF INTESTINAL MALROTATION IN ADULTS - A REVIEW AND CASE REPORT. *(E.)* Steinberg, S. R. (Madigan Army Hosp. Tacoma, Wash.). *Med. Bull. US Army, Eur.* 31(7):204-209, 1974.

6933 DUPLICATION OF THE ILEUM WITH HETEROTOPIC GASTRIC MUCOSA, PSEUDOMYXOME PERITONEI AND NONROTATION OF THE MIDGUT. *(E.)* Duffy, G.; Enriquez, A. A.; Watson, W. C. (Victoria Hosp., London, Canada). *Gastroenterology* 67(2):341-346, 1974.

6934 DUODENAL OBSTRUCTION IN ADULTS. *(E.)* Mukerjee, S.; Talwar, S.; Agarwal, S. C. (Lady Hardinge Med. Coll., New Delhi, India). *Ind. J. Surg.* 35(8):403-405, 1973.

6935 ENDOSCOPIC DUODENAL POLYPECTOMY. *(E.)* Dagradi, A. E.; Ruiz, R. A.; Alaama, A. (Long Beach VA Hosp., Calif.). *Am. J. Gastroenterol.* 61(5):379-382, 1974.

6936 INTRAOPERATIVE UPPER GASTROINTESTINAL ENDOSCOPY AND BIOPSY. *(E.)* Sivak, Jr., M. V.; Esselstyn, Jr., C. B.; Owens, F. J. (Cleveland Clin., Ohio). *Cleve. Clin. Q.* 41(2):67-70, 1974.

6937 TUBERCULOUS PERFORATION OF THE SMALL INTESTINE. *(E.)* Alankar, K.; Rickert, R. R.; Lazaro, E. J.; Swaminathan, A. (Harrison S. Martland Hosp., Newark, N.J.). *Am. J. Gastroenterol.* 62(1):67-70, 1974.

938 ACQUIRED DUODENAL AND JEJUNAL DIVERTICULA. *(Rus.)* Atanasov, A.; Rumenov, I.; Simeon-va, E. (Higher Med. Inst., Sofia, Bulgaria). *Klin. hir.* (9):82-83, 1973.

939 SIGNIFICANCE OF GASTROINTESTINAL RADIATION REACTIONS FOR RADIATION BIOLOGY AND RADIOTHERAPY. *(Ger.)* Oelssner, W. (Radiol. Clin., Karl Marx Univ., Leipzig, Germany). *Wissenschaftl. Z. Karl Marx Univ. [Math. Naturwissenschaftl. Reihe]* 23(1):3-5, 1974.

6940 POSSIBLE WAYS TO REDUCE INTESTINAL RADIATION REACTION BY VARYING THE METHOD OF IRRADIATION. *(E.)* Michailov, W. (Inst. Postgrad. Med., Sofia, Bulgaria). *Wissenschaftl. Z. Karl Marx Univ. [Math. Naturwissenschaftl. Reihe]* 23(1):102-107, 1974.

6941 SOLITARY DUODENAL PLASMOCYTOMA. *(Ger.)* Steckenmesser, R.; Mussmann, J.; Sailer, F. X. (Ctr. Radiol., Justus Liebig Univ., Giessen, Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 120(5):622-624, 1974.

6942 SURGICAL APPROACH TO AN ASSOCIATION OF DUODENAL DIVERTICULA WITH OTHER GASTROINTESTINAL DISEASES. *(Rus.)* Mamykin, S. N. (Kiev Inst. Postgrad. Med., USSR). *Klin. Khir.* (5):55-58, 1973.

6943 CHRONIC DUODENITIS IN CHILDREN. *(Rus.)* Siniavskaia, O. E.; Cherednichenko, A. M. (Sverdlovsk Med. Inst., USSR). *Pediatriia* (7):23-26, 1973.

6944 CONGENITAL MALFORMATION OF THE MESENTERY OF THE SMALL INTESTINE AND OBSTRUCTIVE ILEUS OF THE SMALL INTESTINE. *(Ger.)* Schroller, H. (Gardelegen District Hosp., Germany). *Zentralbl. Chir.* 98(35):1254-1255, 1973.

See also, 6792, 6812, 6814, 6815, 6816, 6859, 6885, 6889, 6904, 6962, 6997, 6999, 7003, 7023, 7053, 7073, 7156, 7182, 7191, 7250, 7254, 7298.

SMALL INTESTINE

Malabsorption

945 A ROENTGENOGRAPHIC CLASSIFICATION OF DIFFUSE DISEASES OF THE SMALL INTESTINE PRE-ENTING WITH MALABSORPTION. *(E.)* Tully, T. E.; einberg, S. B. (Dept. Diag. Radiol., Univ. Minne-ota, Minneapolis). *Am. J. Roentgenol. Radium Ther. ucl. Med.* 121(2):283-290, 1974.

evelopment of peroral biopsy techniques, use of olloidal barium in roentgen examination, and fiber-ptic endoscopy have permitted accurate clinical nd pathologic descriptions of diffuse diseases of he small intestine presenting with malabsorption. proposed 4-part classification for the malabsorption spectrum of diseases is based on the presence or absence of dilation as well as thickness and regularity of the mucosal fold pattern, as determined by small bowel roentgen examination. The various diffuse lesions are grouped as follows: (I) normal small intestine pattern, (II) dilated small intestine with normal folds, (III) thickened regular folds with or without dilatation, and (IV) thickened irregular or nodular folds with or without dilatation. Correlation of these patterns with small bowel biopsy, clinical findings, and simple laboratory methods usually indicates a definite diagnosis. Data processing and computer analysis should be the next step in the application of this classification.

6946 THE FOLATE CONJUGASE ACTIVITY OF THE INTESTINAL MUCOSA IN CELIAC DISEASE. *(E.)*

Jagerstad, M.; Lindstrand, K.; Norden, A.; Westesson, A. K.; Lindberg, T. (Univ. Hosp., Lund, Sweden). *J. Gastroenterol.* 9(3):255-259, 1974.

Folate conjugase activity was compared in small intestinal biopsies from 16 patients with celiac disease and 43 controls with normal intestinal mucosa. Conjugase activity, expressed as ng of mono- and/or diglutamic folate released/mg protein during 10 min, was markedly higher in the flat mucosa of celiac disease than in biopsies with a normal villous structure. The difference in enzyme activity did not reflect a difference in methylation ability: there were no significant differences in folic acid recovery, estimated with *L. casei* and *S. faecelis*, between or within the celiac and control groups. To determine the degree to which inflammatory cells contribute to conjugase activity, leucocytes from normal blood were isolated and further fractionated into lymphocytes and granulocytes. Leukocytes had a folate conjugase activity/mg protein 4 times higher than normal biopsies. All activity was localized in the granulocyte fraction.

6947 THE JEJUNAL CELLULAR INFILTRATE IN COELIAC DISEASE COMPLICATED BY LYMPHOMA. *(E.)*

Ferguson, R.; Asquith, P.; Cooke, W. T. (Gen. Hosp., Birmingham, England). *Gut* 15(6):458-461, 1974.

Lymphocytes and plasma cells in the lamina propria and lymphocytes in the epithelium were quantitated in jejunal biopsies from 18 patients with celiac disease and confirmed lymphoma. Of these patients, 14 were on a normal diet. Counts were compared with those obtained in 15 healthy controls and 30 patients with uncomplicated celiac disease, including 15 on a normal diet and 15 on a gluten-free diet for more than 1 yr. Patients with lymphoma had decreased mean cell counts compared with the other 2 celiac groups and increased mean cell counts compared with controls. The lymphoma patients differed from untreated celiacs in that they had significantly lower plasma cell and significantly higher lymphocyte counts in the lamina propria and significantly lower lymphocyte counts in the epithelium. Differences in cell counts between the lymphoma patients and the celiac patients on a gluten-free diet were not significant. The changes found in 6 of the lymphoma patients were present in biopsies counted up to 5 yr before the diagnosis of lymphoma. The results suggest that the immunological status of celiac patients with lymphoma differs from that of other celiacs and could represent a primary abnormality. Consequently, plasma cell and intraepithelial lymphocyte counts might indicate those celiac patients who are prone to develop malignancy.

6948 CHANGES IN PLASMA FREE FATTY ACID CONCENTRATION FOLLOWING ORAL LACTOSE TOLERANCE TESTS AS A TEST FOR LACTOSE ABSORPTION IN INFANTS AND CHILDREN. *(E.)*

Tamir, I.; Levtow, O.; Dolizki, F.; Werbin, B. (Rokach Hosp., Tel Aviv, Israel). *Am. J. Dig. Dis.* 19(8):745-750, 1974.

Changes in blood glucose and plasma free fatty acid following oral lactose tolerance tests were measured in 3 groups of children. Of 17 infants, aged 1-16 months, with secondary lactose intolerance, 3 showed a small increase (less than 25 mg/100 ml) in glucose levels, but a normal decline of more than 50% from the fasting value in the free fatty acid concentration. When milk feeding was resumed, it became obvious that they were not intolerant to lactose. Of 16 infants, aged 2-21 months, with acute gastroenteritis but no evidence of intolerance to dietary sugar, 6 showed only small increases in glucose and 5 of the 6 showed a normal decline in plasma free fatty acids. The 3rd group consisted of 19 children, aged 2.5-14.5 yr, undergoing investigation due to growth retardation. In 6 of these 19 children, clinical symptoms of lactose intolerance developed after the oral lactose tolerance tests. In all 6, a flat glucose curve and a decline of less than 50% in plasma free fatty acids was noted. These patients were diagnosed as lactose intolerant. Of the remaining 13 children, none showed evidence of lactose intolerance. In 9 of them a flat glucose curve was obtained, but only 1 of the 13 had no decline in plasma free fatty acids. Based on blood glucose levels in this study, 37% of the children with lactose intolerance secondary to acute gastroenteritis and 47% of the children without lactose intolerance would have been incorrectly diagnosed on the basis of changes in plasma free fatty acids. It is suggested that a decline in free fatty acids of 50% or more from the fasting level 30 or 60 min after ingestion of lactose be accepted as an indicator of normal hydrolysis and absorption of lactose.

6949 DISACCHARIDASE ACTIVITY IN THE SMALL INTESTINAL MUCOSA IN CASES WITH ACUTE ENTERITIS. *(E.)*

Gudmand Hoyer, E.; Soeberg, B. (Blegdams Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(4):405-409, 1974.

Disaccharidase activity was measured in biopsies from the small intestine of patients (5 females and 6 males, aged 18-70 yr) with acute enteritis. Biopsies were taken in the acute phase and at least 3 months after recovery. On the whole, transient lowering of the lactase activity was encountered, and in 2 patients values corresponding to lactose malabsorption were found. The activity of the remaining enzymes was unaffected, although diffuse reduction of the lactase activity was found in 2 patients with subtotal atrophy of the villi. In the remaining 9 patients, only uncharacteristic histological changes could be observed. Even excluding the 2 patients with subtotal villous atrophy, the lactase activity during acute enteritis was significantly reduced, indicating that lactase is the enzyme most sensitive to lesions of the small intestinal mucosa. Thus, a lactase determination is a more indicative measurement of such difficulties than a histological examination. The fact that persistent lactase deficiency may result from tropical sprue and kwashiorkor, in spite of sufficient treatment and normalization of the intestinal mucosa, supports the concept of lactase as the most vulnerable enzyme.

950 JEJUNAL ABSORPTION AND SECRETION OF CALCIUM
IN PATIENTS WITH CHRONIC RENAL DISEASE ON
EMODIALYSIS. *(E.)* Parker, T. F.; Vergne-Marini, P;
ull, A. R.; Pak, C. Y. C.; Fordtran, J. S. (Univ.
exas Southwestern Med. Sch., Dallas). *J. Clin.
nvest.* 54(2):358-365, 1974.

en patients with chronic end-stage renal disease on
emodialysis and 8 normal controls were studied by
onstant jejunal perfusion of calcium gluconate so-
utions (11 ml/min for 1 hr after 3/4 hr for equili-
ration) using 0.5% polyethylene glycol as a non-
bsorbable marker. Solutions isosmotic to blood
lasma contained 0, 1, 5, 15, and 20 mM calcium gluc-
nate. Results in normals indicated that calcium
bsorption from 1 and 5 mM calcium solutions is mainly
ctive. Absorption from 5, 15, and 20 mM solutions
as a linear function of luminal calcium concentra-
ion, suggesting that the active transport carrier
s saturated when luminal calcium concentration is
reater than 5 mM and indicating that the increment
n absorption at higher luminal concentrations is
ainly the result of passive absorption. With 1 mM
alcium, normals absorbed calcium against a concen-
ration gradient, whereas the patients secreted cal-
ium. Absorption in the patients was much less than
ormal with 5, 15, and 20 mM luminal calcium concen-
rations; however, the slope of this linear (passive)
ortion of the curve was normal. Unidirectional cal-
ium fluxes were measured with ^{47}Ca. Flux out of the
umen was depressed 2.5-fold in the patients, but
lux into the lumen was normal. Xylose, urea, and
ritiated water were absorbed normally, indicating
o generalized abnormality of jejunal transport in
hese patients. Endogenous calcium secretion, esti-
ated by the amount of calcium added to a calcium-
ree solution, was normal in the dialysis patients.
hese results indicate that active calcium absorption
s markedly depressed in patients with chronic renal
isease who are receiving hemodialysis therapy. On
he other hand, passive calcium movement and endogen-
us calcium secretions are normal.

951 JEJUNAL CALCIUM TRANSPORT IN HEALTH AND
METABOLIC BONE DISEASE: EFFECT OF VITA-
IN D. *(E.)* Soergel, K. H.; Mueller, K. H.; Gustke,
. F.; Geenen, J. E. (Med. Coll. Wisconsin, Milwau-
ee). *Gastroenterology* 67(1):28-34, 1974.

et absorption and unidirectional fluxes of calcium
ere determined by continuous intestinal perfusion
f a 30-cm segment of proximal jejunum on 24 occa-
ions in 12 children. The test solution contained
alcium gluconate (2.5 mM/liter) and radioactive ^{47}Ca.
he subjects included 5 patients with sporadic vita-
in D-resistant rickets and 1 each with florid nutri-
ional rickets and with acute disuse osteoporosis.
n controls, the bidirectional calcium flux across
he luminal cell wall of the absorbing epithelium was
mall in magnitude. Jejunal calcium absorption was
ecreased in all untreated patients; in 5 cases, this
as attributable to a reduction in mucosal calcium
ptake, but 2 patients with vitamin D-resistant rick-
ts demonstrated an unexpected increase in calcium
lux in the reverse direction. Therapy with vitamin
2 (25,000-100,000 U/day p.o.) invariably resulted in accelerated net calcium absorption without changes in net transport of water, sodium, chloride, and potassium, and in flow rate and calcium content of fasting intestinal contents. A linear correlation existed between a jejunal net calcium absorption and net calcium absorption determined in 22 preceding metabolic balance studies. Jejunal net calcium absorption of less than 3 μM/hr/cm correctly separated patients with untreated metabolic bone disease from treated patients and controls on 22 of 23 occasions. Jejunal calcium absorption, determined by steady-state intestinal perfusion, was a reliable and convenient indicator of tocal calcium balance in this group of children.

6952 LUMINAL EVENTS OF LIPID ABSORPTION IN PROTEIN-CALORIE MALNOURISHED CHILDREN; RELATIONSHIP WITH NUTRITIONAL RECOVERY AND DIARRHEA. I. CAPACITY OF THE DUODENAL CONTENT TO ACHIEVE MICELLAR SOLUBILIZATION OF LIPIDS. *(E.)* Schneider, R. E.; Viteri, F. E. (Inst. Nutr. Central America Panama, Guatemala City, Guatemala). *Am. J. Clin. Nutr.* 27(8):777-787, 1974.

Fat absorption and the capacity of the duodenal content to achieve micellar solubilization of lipids was studied in 18 severely protein-calorie malnourished children (aged 15-70 months) on admission and at different stages of nutritional recovery. Four healthy children (aged 17-23 months) served as controls. The micellar lipid concentration in duodenal aspirates was 6.60 mg/ml in controls, compared with 0.86 mg/ml in patients with diarrhea and 2.81 mg/ml in patients without diarrhea. In children without diarrhea, micellar lipid increased with nutritional recovery and ultimately reached normal values. Diarrhea hampered this improvement and was associated with larger amounts of duodenal aspirates in 90 min and higher dilution of the emulsion. Fat absorption was normal (greater than 90% of intake) only in recovered or recovering children without diarrhea and with micellar lipid concentrations greater than 4 mg/ml. Regardless of the degree of protein repletion, none of the children with diarrhea had normal fat absorption. Stepwise regression analysis showed that conjugated bile acids accounted for 36% of the observed variation in micellar lipid, while free bile acids and lipase activity each accounted for 8%. Dilution and nitrogen accounted, resp., for 0.8 and 0.2% of the variability. Although micellar lipid rose as conjugated bile acid concentration increased, a discrete but opposite trend was observed with free bile acids. It is concluded that conjugated bile acids and an elevation in the ratio of free bile acids to conjugated bile acids plays an important role in decreasing micellar lipid capacity and lipid absorption in children with protein-calorie malnutrition or diarrhea.

6953 LUMINAL EVENTS OF LIPID ABSORPTION IN PROTEIN-CALORIE MALNOURISHED CHILDREN; RELATIONSHIP WITH NUTRITIONAL RECOVERY AND DIARRHEA. II. ALTERATIONS IN BILE ACID CONTENT OF DUODENAL ASPIRATES. *(E.)* Schneider, R. E.; Viteri, F. E. (Inst. Nutr. Central America Panama, Guatemala City, Guatemala). *Am. J. Clin. Nutr.* 27(8):788-796, 1974.

Duodenal aspirates from 18 children with protein-calorie malnutrition, with or without diarrhea, were analyzed for quantitative and qualitative alterations in bile acids. Data were obtained on admission and during nutritional recovery. Compared with 4 healthy controls, children with protein-calorie malnutrition had significantly decreased concentrations of conjugated bile acids and significantly increased amounts of primary and secondary free bile acids. In the absence of diarrhea, protein-calorie malnutrition was associated with relatively uniform decrements of conjugated bile acids, which returned to normal levels with nutritional recovery. The amounts of primary and secondary free bile acids did not change significantly with recovery. Recovered children with diarrhea did not attain the normal levels of conjugated bile acids noted in recovered children without diarrhea. This was due primarily to decreased amounts of both glyco- and taurocholate, but especially to the taurocholate decrement. The glycine/taurine ratio was therefore higher in recovered children with diarrhea than in any other group, although the differences were not significant. While all free bile acids increased in recovered children with diarrhea, the most significant increases were in cholic and lithocholic acids. Levels of primary and secondary free bile acids were similar in malnourished children with and without diarrhea. It is concluded that the observed alterations in bile acids were due to the interaction of malnutrition, diarrhea, and bacterial degradation (i.e., deconjugation and dehydroxylation) of bile acids in the intestinal lumen.

6954 IRON ABSORPTION FROM SOUTHEAST ASIAN DIETS. *(E.)* Hallberg, L.; Garby, L.; Suwanik, R.; Bjorn-Rasmussen, E. (Dept. Med., Univ. Goteborg, Sweden). *Am. J. Clin. Nutr.* 27(8):826-836, 1974.

6955 ACRODERMATITIS ENTEROPATHICA: A LETHAL INHERITED HUMAN ZINC-DEFICIENCY DISORDER. *(E.)* Moyhanan, E. J. (Hosp. Sick Children, London, England). *Lancet* (7877):399-400, 1974.

6956 PRIMARY ADULT LACTOSE INTOLERANCE IN THE KIVU LAKE AREA: RWANDA AND THE BUSHI. *(E.)* Cox, J. A.; Elliott, F. G. (Dept. Biochem., Nat. Univ., Kinshasa, Zaire). *Am. J. Dig. Dis.* 19(8):714-724, 1974.

6957 CONGENITAL LACTOSE INTOLERANCE OF GASTROGEN ORIGIN ASSOCIATED WITH CATARACTS. *(E.)* Russo, G.; Mollica, F.; Mazzone, D.; Santonocito, B. (Pediatr. Clin., Univ. Catania, Italy). *Acta Pediatr. Scand.* 63(3):457-460, 1974.

6958 LACTASE IN CHILDHOOD - A NON-ADAPTABLE ENZYME. *(E.)* Gilat, T.; Dolizky, F.; Gelman-Malachi, E.; Tamir, I. (Munic. Hosp., Tel Aviv, Israel). *Scand. J. Gastroenterol.* 9(4):395-398, 1974.

6959 BLIND LOOP SYNDROME ASSOCIATED WITH GROWTH RETARDATION. *(E.)* Hughes, J. M. (Winter Park Mem. Hosp., Florida). *Gastroenterology* 67(2):338-340, 1974.

6960 CELIAC DISEASE: ENDOSCOPIC OBSERVATIONS. *(E.)* Pastore, R. A. (Fitzsimons Army Med. Ctr., Denver, Col.). *Am. J. Gastroenterol.* 61(6):478-480, 1974.

6961 CIRCULATING ANTIBODIES TO WHEAT GLIADIN FRACTIONS IN COELIAC DISEASE. *(E.)* Cornell, H. J. (Roy. Children's Hosp., Melbourne, Australia). *Arch. Dis. Child.* 49(6):454-458, 1974.

6962 INTESTINAL TUBERCULOSIS. II. GASTOINTESTINAL ABSORPTION STUDIES. *(E.)* Pimparkar, B. D.; Donde, U. M. (K. E. M. Hosp., Bombay, India). *J. Assoc. Physicians India* 22(3):219-228, 1974.

6963 IMMUNOLOGICAL STUDIES OF THE INTESTINAL MUCOSA IN NORMAL SUBJECTS AND ADULT COELIAC DISEASE. *(E.)* Gasbarrini, G.; Miglio, F.; Serra, M.; Roda, E.; Bernardi, M. (Med. Pathol. I, Univ. Bologna, Italy). *Rend. Gastroenterol.* 5(3):229, 1973

6964 CONGENITAL GLUCOSE-GALACTOSE MALABSORPTION. *(E.)* Wimberley, P. D.; Harries, J. T.; Burgess, E. A. (Hosp. Sick Children, London, England) *Proc. R. Soc. Med.* 67(8):755-756, 1974.

6965 MAGNESIUM DEFICIENCY. *(E.)* Flink, E. B. (West Virginia Univ. Sch. Med., Morgantown) *Rocky Mt. Med. J.* 71(1):396-397, 1974.

6966 TROPICAL SPRUE IN AN 11-YEAR-OLD GIRL. *(E.)* Bissenden, J. G. (Hosp. Sick Childre London, England). *Proc. R. Soc. Med.* 67(8):760-762, 1974.

6967 PRIMARY INTESTINAL LYMPHANGECTASIA, CHRONIC HEPATITIS, AND AUSTRALIA ANTIGEN. *(Fr.* Capron, J. P.; Pessayre, D.; Bitoun, A.; Degott, C.; Erlinger, S. (Beaujon Hosp., Clichy, France). *Arch. Fr. Mal. App. Dig.* 63(3):223-228, 1974.

6968 JEJUNAL MUCOSA IN PATIENTS WITH PROTEIN MALNUTRITION, ANEMIA, AND PARASITIC DISEASES. *(Por.)* Vannucchi, H.; de Franco, M. F.; Campana, A. O. (Fac. Med. Biol. Sci., Botucatu, Brazil). *Arq. Gastroenterol.* 11(2):61-64, 1974.

6969 NODULAR LYMPHOID HYPERPLASIA OF THE SMALL INTESTINE AND HYPOGAMMAGLOBULINEMIA: BENEFICIAL EFFECT OF A GLUTEN-FREE DIET. *(Fr.)* Gamerman, H.; Vesin, P.; Milhaud, G.; Huguenin, P.; Rome R. (Montreuil Intercommunal Hosp., Paris, France). *Nouv. Presse Med.* 3(24):1535-1538, 1974.

970 GASTROINTESTINAL PROBLEMS IN CHILDREN WITH IMMUNOLOGICAL ABNORMALITIES. *(Fl.)* Eg-
ermont, E.; Marien, P.; Molla, A. M.; van Damme, B.
St. Rafael Univ. Hosp., Louvain, Belgium). *Acta
ediatr. Belg.* 27(4):233-256, 1973.

971 INTESTINAL CALCIUM ABSORPTION AND DISORDERS IN IT. II. CLINICAL MANIFESTATIONS
DISORDERS IN CALCIUM ABSORPTION. *(Ger.)* Ewe,
(1st Med. Clin. Polyclin., Johannes Gutenberg
iv., Mainz, Germany). *Klin. Wochenschr.* 52(2):
-73, 1974.

72 CALCIUM ABSORPTION IN SUBJECTS WITH LACTOSE INTOLERANCE. I. ABSORPTION OF UNLABELLED
LCIUM. *(Cz.)* Kocian, J.; Skala, I. (Inst. Postgrad. Med. Pharm., Prague, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 28(1):37-42, 1974.

6973 CALCIUM ABSORPTION IN SUBJECTS WITH LACTOSE INTOLERANCE. II. ABSORPTION OF ISOTOPE ^{47}Ca. *(Cz.)* Kocian, J.; Skala, I.; Bakos, K. (Inst. Postgrad. Med. Pharm., Prague, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 28(3):167-172, 1974.

See also, 6565, 6740, 6903, 7069, 7276, 7288.

LARGE INTESTINE

74 RECURRENCE OF CARCINOMA OF THE LARGE INTESTINE: A STATISTICAL REVIEW. *(E.)*
indo, K. (Osaka Univ. Hosp., Japan). *Am. J. Proc-
l* 25(3):80-90, 1974.

statistical analysis was conducted on 2,299 autopsy
ses and 116 surgical cases of recurrence from col-
ectal cancers. In 85% of the cases, recurrences
curred within 3 yr after radical operation. Rectal
rcinoma metastasized to the liver in 47% and to the
lvis in the same percentage of cases. Colonic can-
r metastasized to the liver in 51% of the cases.
lmonary metastases occurred in 39% of rectal and
31% of colonic carcinomas. Of the patients with
ng metastases, 71% also had liver metastases.
inically demonstrated local recurrences were found
57% of the cases. Ascites was noted in the ter-
nal stage of recurrence due to peritoneal carci-
matosis, carcinogenic hypoproteinemia, and portal
pertension from compression. Palliative treatment
nsisting of blood or plasma transfusions, diuretics,
d i.p. infusion of anticancer agents is recommended.
e selective intraarterial infusion of 5-fluorouracil
recommended for management of colorectal cancer.
ltiple recurrent lesions may be treated by the
stemic use of 5-fluorouracil (5 g/course), cyclophos-
amide (5 g/course), and mitomycin C (50 mg/course).
diation therapy, including radium implants, is indi-
ted in pelvic recurrences, and a moderately aggressive
urse should be followed if the patient can follow it.
operation was curative in 15.5% of the cases, and
.5% of those undergoing reoperation remained in
od condition. The age-adjusted 5-yr survival rate
s 7% in patients with recurrent colorectal carci-
ma.

75 ENZYMATIC STUDIES OF NORMAL AND MALIGNANT INTESTINAL EPITHELIUM. *(E.)* Salser, J.
; Balis, M. E. (Sloane-Kettering Inst. Cancer Res.,
York, N.Y.). *Cancer* 34(3):889-895, 1974.

evious studies have suggested that DNA synthesis
d thymidine kinase activity are increased in precancerous cells and that tumor cells of the colon are under controls that more closely resemble those in crypt than in surface cells. To further investigate this, thymidine kinase activity was studied in extracts from tumors and adjacent normal gastrointestinal mucosa obtained from surgical specimens. Thymidine kinase activity was present in 2 forms: one soluble and one particulate-associated. Both forms were activated by phospholipase C. Most of the soluble activity was in the dividing cells of the crypts. Nondividing surface cells were stimulated more by phospholipase C than were crypt cells. Tumor cells, but not fetal tissue, had greater thymidine kinase activity than normal mucosa. Thymidine kinase activity of tumors of the stomach, ileum, and cecum were not increased by phospholipase C, whereas normal tissue thymidine kinase activity was stimulated 2.5-fold. Fetal thymidine kinase was increased 7 to 10-fold by phospholipase C, a finding in contrast to previous reports. Heat inactivation studies and studies of the effects of mercaptans and glutathione on thymidine kinase activity suggest that thymidine kinase in tumors differs from that in normal colon.

6976 CHANGES IN COMPOSITION OF MUCIN IN THE MUCOSA ADJACENT TO CARCINOMA OF THE COLON AS COMPARED WITH THE NORMAL: A BIOCHEMICAL INVESTIGATION. *(E.)* Filipe, M. I.; Cooke, K. B. (Westminster Med. Sch., London, England). *J. Clin. Path.* 27(4):315-318, 1974.

In patients with carcinoma of the large intestine, samples of normal mucosa distant from the tumor as well as specimens from mucosa immediately adjacent to the tumor (transitional mucosa) were analyzed for protein, hexosamine, and sialic acid levels. The ratios of protein/wet weight of tissue were constant in the mucosa from both areas. However, a highly significant increase of hexosamine values, measured as glucosamine HCl, was seen in transitional mucosa (1.90 μg/mg wet tissue) compared with normal mucosa (1.38). A similar significant difference was found between sialic acid content of transitional mucosa (1.31) and that of normal mucosa (0.78 μg/mg wet weight of tissue). The results suggest that the epithelial cells of the transitional mucosa may be of the immature type on the basis of increased hexosamine levels and also higher percentage of neuraminidase-sensitive sialic acids. The overall picture of these cells producing mainly sialomucus rather than sulfated material is similar to the pattern of goblet cells in early fetal life. Available data do not permit certain conclusions as to whether that comparison is a true one and if so, what factors are responsible for regression to an embryonic type of cell activity.

6977 MULTIPLE CARCINOMAS OF THE COLON AND RECTUM.

(E.) Ekelund, G.R.; Pihl, B. (Malmo Gen. Hosp., Sweden). *Cancer* 33(6):1630-1634, 1974.

Of 960 patients with colorectal carcinoma seen over a 10-yr period, 44 (4.6%) had multiple synchronous carcinomas and 22 (2.3%) had metachronous carcinomas. The group with synchronous carcinomas consisted of 28 men and 16 women with a mean age of 68 yr; 7 of these patients had 3 lesions and 37 had 2. Of the total of 95 carcinomas, 55% were located in the rectum and sigmoid colon. At least 1 adenomatous or adenovillous polyp was found in 24 (54.6%) of the 44 patients with synchronous carcinomas. Surgery was performed on 29 of these patients and a palliative procedure on 13. In this group, the corrected 5- and 10-yr survival rate was about 41%, while the crude 10-yr survival was 24%. These rates did not differ significantly from those of the parent series. Of the 22 cases of metachronous carcinomas, 14 were previous to and 8 subsequent to surgery. The average interval between detection of the 1st and 2nd lesions was 104 months, and in 6 cases the 2nd lesion was found only at autopsy. Nine of the remaining 16 patients were men and 7 were women with a mean age of 70 yr at time of discovery of the 2nd lesion. Six of the 16 patients had adenomatous or adenovillous polyps, while 1 had a submucous lipoma. The corrected 5- and 10-yr survival rates after treatment of the 2nd lesion were 51.3% and 30.7% resp.; the corresponding crude figures were 37.5% and 15.0%. In this population, the average annual incidence of multiple primary colorectal carcinoma was 2.6/100,000 inhabitants. The results indicate that every case of colorectal carcinoma requires a thorough preoperative examination of the large intestine. Patients undergoing surgery for cure should be regularly followed up for the rest of their lives for metachronous carcinomas. Therefore, figures on the frequency of metachronous carcinomas are regarded as provisional.

6978 STUDIES OF MITOTIC ACTIVITY OF ADENOCARCINOMATOUS CELLS IN THE RECTUM.

(E.) Kalcheva, V.; Tileva, M. D. (Med. Acad. Fac. Med., Plovdiv, Bulgaria). *J. Abdom. Surg.* 16(6):160-161, 1974.

The mitotic activity of adenocarcinoma cells in the rectum was studied in 34 biopsy specimens. Morphologically, all 24 graded adenocarcinomas belonged to grades II or III and mitotic activity was almost ide tical for cells of both grades. The mean mitotic index was 19.9/1000 cells for grade II and 22.6/1000 cells for grade III, while the range of the index was 7.3-36.5/1000 cells for the two grades. The difference in mitotic activity between grade II and III cells and that of normal intestinal crypt cells was statistically significant. In 10 gelatinous adenocarcinomas, mitotic activity was low (mean, 5.0/1000 cells) and did not differ significantly from that of normal cells. Analysis of clinical data indicated that, regardless of differentiation grade, the mitot index of cancer lesions localized in the bowel was almost twice that of neoplastic cells invading surrounding tissue and involving lymph nodes.

6979 GOBLET CELL CARCINOID OF THE APPENDIX.

(E.) Subbuswamy, S. G.; Gibbs, N. M.; Ross, C. F.; Morson, B. C. (St. Mark's Hosp., London, England). *Cancer* 34(2):338-344, 1974.

Tumorous appendix tissue removed at appendectomy from 7 men and 5 women (aged 21-69 yr) was examined to identify the neoplasms. All but 2 of the 12 tumors were microscopic. Diffuse involvement of the whole appendix was found in only 1 case, whereas th tumors were at the proximal part in 4 patients, at the distal half in 4, and at the tip in 3. Histologically, the tumors differed from both ordinary carcinoid and adenocarcinoma in that the principal cell type closely resembled normal goblet cells of intestinal epithelium. These cells contained distinct mucin globules which were predominantly acid. In addition, argentaffin and Paneth's cells were present in considerable numbers in some tumors. In all cases, continuity of submucosal tumor cells wit basiglandular cells in the mucous membrane crypts was observed. A kinship with carcinoid was suggested by the basiglandular position of the tumor, its well-differentiated character, and good prognosis after simple appendectomy. However, the histology is sufficiently different to warrant separate classification as a goblet cell carcinoid. Of the 9 pa tients treated by simple appendectomy, 6 are well 2-5 yr after the operation; 1 was lost to followup, 1 died from coronary thrombosis, and 1 died from carcinoma of the stomach. Of the 3 patients who un derwent appendectomy followed by right hemicolectomy, 1 is well after 6 yr, 1 developed primary carci noma of the prostrate after 2 yr, and 1 developed bilateral ovarian tumors and peritoneal metastases after 5 yr. In the last case, the histology was al most identical to that of the primary tumor of the appendix.

6980 INDUCTION OF COLONIC CANCER IN THE RAT BY A SINGLE INJECTION OF 1,2-DIMETHYLHYDRAZI

(Fr.) Martin, M. S.; Martin, F.; Justrabo, E.; Knopf, J. F.; Bastien, H.; Knobel, S. (Lab. Exp. Me Immunol., Fac. Med., Dijon, France). *Biol. Gastroenterol. (Paris)* 7(1):37-42, 1974.

Consanguineous BD IX rats, bred by mating brothers with sisters, were injected with 1,2-dimethylhydraz (40 mg/kg s.c.) at ages 1, 10, and 30 days. Of the

rats treated, 11 developed carcinomas of the
on, 5 colonic dysplasia, and 6 colonic hyperplasia.
the 11 colonic carcinomas, 1 developed in a rat
ected at age 1 day, 3 in rats injected at age 10
s, and 7 in rats injected at age 30 days. The
reasing incidence of carcinomas with age may re-
t from the fact that microsomal hydroxylase, which
verts dimethylhydrazine into azoxymethane and then
o methylazoxymethanol, is present at birth but
y reaches maximum levels at age 30 days. The
n survival time for rats with colonic cancer was
days and ranged from 600 days for those treated
ages 1 and 10 days to 420 days for those treated
age 30 days. Most of the tumors were highly dif-
entiated adenocarcinomas, but some were atypical
us-secreting carcinomas. No metastases, such as
se which occurred previously in rats injected re-
tedly with 1,2-dimethylhydrazine, were found. Ex-
intestinal lesions included gastric glandular hy-
plasia (7 cases); 1 adenoma and 1 cavernous heman-
ma of the liver; 1 fibrosarcoma and 1 dysgenetic
or of the kidney; and 1 salivary gland adenoma.
tic dilatation of the biliary tract and granular
enerative lesions of the liver were also relatively
mon. These findings suggest that colonic cancer
result from a single exposure to a carcinogen in
ldhood or adolescence and point up the difficul-
s encountered in etiological investigations of in-
tinal carcinomas in humans.

1 PHYSIOLOGICAL STUDIES ON THE LARGE INTES-
TINE OF MICE WITH HEREDITARY MEGACOLON AND
ENCE OF ENTERIC GANGLION CELLS. *(E.)* Wood, J.
(Univ. Kansas Med. Ctr., Kansas City). *Proc. Int.*
p. Gastrointest. Motility, 4th, 1973, pp. 177-187.

electrical and mechanical activity of the large
estine was studied in piebald mice and their nor-
siblings. Piebald mice carry a recessive gene
ch reduces the number of ganglion cells of the
tal colon and rectum and produces megacolon simi-
to Hirschsprung's disease. Electrical slow
es and action potentials occurred in the large in-
tines of both normal and abnormal mice. The prin-
al difference between normal mice and their abnor-
siblings was increased incidence of discharge of
ion potentials associated with uncoordinated pha-
contractions superimposed upon tonic contracture
the circular muscle layer of the distal aganglion-
segment in the abnormal mouse. The distended colon
the abnormal mouse and the entire length of the nor-
bowel showed bursts of action potentials which ac-
npanied peristaltic waves of circular muscle contrac-
on. During propulsive motility in the rectum, ac-
vation of the circular muscle was preceded by coor-
nated contraction of the longitudinal muscle only in
normal bowel. These findings suggest that inherent
ction of the muscularis externa is not impaired in
e with megacolon. Abnormal motor activity of the
nglionic segment *in vitro* appears to result entirely
om the absence of regulation and coordination of
musculature by enteric ganglion cells. Neuronal
ckade with 2.25 x 10^{-5} g/ml lidocaine produced in
distended region of the abnormal colon and along
entire length of the normal colon an increase in
ike activity and uncoordinated contractile activity
ich resembled the electrical and mechanical activity
the aganglionic segment in the absence of drugs.

6982 INTERNAL ANAL SPHINCTER DERANGEMENT WITH ANAL FISSURES. *(E.)* Nothmann, B. J.; Schuster, M. M. (Baltimore City Hosp., Md.). *Gastroenterology* 67(2):216-220, 1974.

Manometric studies were performed on the internal and external anal sphincters on 7 patients with confirmed anal fissures, 7 patients with irritable bowel syndrome, and 10 normal controls. In patients with irritable bowel syndrome and in the control group, rectal distension with 50 ml of air caused an abrupt relaxation of the internal sphincter lasting for an average of 15 sec and a brief rapid contraction of the external sphincter which coincided with relaxation of the internal sphincter. Relaxation of the internal sphincter also occurred in patients with anal fissures, but this was followed by a marked and often prolonged contraction above the initial base line. Although this overshoot phenomenon sometimes occurred in controls and patients with irritable bowel syndrome, (1) resting pressure in the internal sphincter balloon was higher in patients with fissures; (2) the overshoot pattern occurred in 90% of suprathreshold distensions performed on patients with fissures and in only 26% of other subjects; (3) amplitude of the overshoot contraction was higher in patients with fissures; and (4) the threshold for stimulation of overshoot was lower in patients with fissures. The overshoot phenomenon was no longer observed, and reflex responses had returned to normal in all 3 patients studied after successful treatment of fissures. Administration of diazepam (10 mg i.v.) to a patient with anal fissures completely abolished the external sphincter response, while the internal sphincter response remained unchanged and continued to demonstrate the overshoot pattern. Overshoot was also observed in a patient who, in addition to an anal fissure, had a spinal cord lesion which resulted in complete paralysis of the external anal sphincter. These findings suggest that the external anal sphincter is not significantly involved in the pathophysiology of anal fissures. A reflexly stimulated internal sphincter spasm, which may occur when stool enters the rectum or during defecation, appears to be more important. Therefore, surgical approaches should be directed to the internal, rather than to the external, anal sphincter.

6983 REMOVAL OF POLYPS OF COLONOSCOPY. *(Fr.)* Bognel, J. C.; Liguory, A.; Bitoun, A.; Duhamel, J. (St. Antoine Hosp., Paris, France). *Vie Med. (Paris)* 54(36):4615-4616, 4625-4626, 1973.

By using an A.C.M.I. fiber colonoscope attached to a diathermy loop, 30 colonic polyps were removed from 26 patients. Although polyps can be removed on an outpatient basis, it is recommended that patients be hospitalized if they are in poor condition, if intensive premedication is necessary, or if surgery presents any difficulties. Under ideal conditions, the head of the polyp should not measure more than 2 cm, it should have a straight stalk at least 1 cm long, and it should be located in a straight, wide part of the colon. After mechanical coagulation, the polyps were coagulated by brief and repeated passage of current through them. Polyps were then extracted and subjected to histological examination. Of the 30 polyps removed, 3 were inflammatory, 22 were benign, 1 was degenerated, and 4 were malignant. Secondary surgical resections were performed on most of the malignant polyps. An 80-yr-old patient who had 3 polyps, including a large malignant sessile polyp, developed pelvic peritonitis 24 hr after endoscopy. Laparotomy and resection could not be performed in this case because the patient had hypertension and had suffered a recent myocardial infarction. Although the peritonitis responded to massive doses of antibiotics, the patient died suddenly of an embolism 15 days after endoscopic removal of the polyps. Another patient developed acute pneumoperitoneum shortly after colonoscopy but responded to exsufflation with a needle. None of these patients bled.

6984 ABNORMAL PATTERNS OF MUCUS SECRETION IN APPARENTLY NORMAL MUCOSA OF LARGE INTESTINE WITH CARCINOMA. *(E.)* Filipe, M. I.; Branfoot, A. C. (Westminster Med. Sch., London, England). *Cancer* 34(2):282-290, 1974

6985 GARDNER'S SYNDROME: REPORT OF A FAMILY. *(E.)* Koren, E.; Lazarovitch, A.; Baratz, M.; Loewenthal, M.; Solowiejczyk, M. (Ichilov Munic. Government Med. Ctr., Tel Aviv, Israel). *Ann. Surg.* 180(2):198-202, 1974

6986 THE POLYP-CANCER SEQUENCE IN THE LARGE BOWEL. *(E.)* Morson, B. (St. Mark's Hosp., London, England). *Proc. Roy. Soc. Med.* 67 (6):451-457, 1974.

6987 CARCINOMA OF THE APPENDIX. *(E.)* Megens, J. G. N.; Zwart, W. A. J. (St. Hippolytus Hosp., Delft, Netherlands). *Arch. Chir. Neerl.* 26 (11):181-187, 1974.

6988 LEIOMYOMA OF THE SIGMOID COLON. *(E.)* Anagnostou, G. D.; Bramis, J.; Golematis, B. (Univ. Athens, Sch. Med., Greece). *Int. Surg.* 59(3):183-184, 1974.

6989 EXAMINATION FOR AEROBIC AND ANAEROBIC BACTERIA IN HUMAN PORTAL BLOOD COLLECTED BY TRANSUMBILICAL CATHETERIZATION. *(E.)* Dencker, H.; Kamme, C.; Norryd, C.; Mardh, P. A.; Tylen, U. (Dept. Surg., Univ. Lund, Sweden). *Scand. J. Gastroenterol.* 9(4):367-369, 1974.

6990 THE IRRITABLE COLON SYNDROME -- AN UNHAPPY COINCIDENCE? *(E.)* Ritchie, J. A. (Radcliffe Infirm., Oxford, England). *Tijdschr. Gastroenterol.* 16(4):243-253, 1973.

6991 ERRORS IN THE DIAGNOSIS OF ACUTE APPENDICITIS BASED ON STATISTICS FROM A HOSPITAL SURGICAL CLINIC. *(Rus.)* Solov'ev, V. A.; Puglieeva, V. P. (I. P. Pavlov 1st Med. Inst., Leningrad, USSR). *Klin. Khir.* (5):42-45, 1973.

6992 DIFFERENTIAL DIAGNOSIS OF ACUTE APPENDICITIS IN WOMEN. *(Rus.)* Rychkovskii, G. F. (Orenburg Med. Inst., USSR). *Klin. Khir.* (5):40-41, 1973.

6993 ERRORS AND HAZARDS IN THE DIAGNOSIS OF ACUTE APPENDICITIS DURING PREGNANCY. *(Rus.)* Taranenko, L. D.; Podonenko-Bogdanova, A. P. Oberemchenko, A. I. (A. M. Gorki Med. Inst., Donetsk USSR). *Klin. Khir.* (5):37-40, 1973.

6994 MORPHOLOGICAL CHANGES IN THE MUCOSA OF THE LOWER LARGE INTESTINE IN Shigella sonnei DYSENTERY IN CHILDREN FROM THE FINDINGS OF RECTOROMANOSCOPY AND ASPIRATION BIOPSY. *(Rus.)* Solov'eva, F. A. (no affil.). *Pediatriia* (11):67-69, 1973.

6995 PATHOGENESIS OF PARAPROCTITIS AND CHRONIC PARARECTAL FISTULAS. *(Rus.)* Bezlutskii, G. S. (Kuban Med. Inst., Krasnodar, USSR). *Klin. Khir.* (8):35-39, 1973.

6996 CRITERIA FOR EVALUATING THE DISABILITY OF PATIENTS AFTER ANTERIOR RESECTION OF THE RECTUM FOR CANCER. *(Rus.)* Narychev, A. A.; Ibragimov, U. A. (Central Inst. Labor Expertise Occup. Counselling Disabled, Moscow, USSR). *Vopr. Onkol.* 20(5):28-32, 1974.

6997 GASTROINTESTINAL CHANGES IN TELEGAMMA THERAPY OF ABDOMINAL TUMORS. *(Ger.)* Glaser, F. H.; Beutler, W.; Klaua, M.; Kraft, M.; Salewski, D. (Dept. Med., Martin Luther Univ., Halle/Saale, Germany). *Wissenschaftl. Z. Karl Marx Univ.* [*Math. Naturwissenschaftl. Reihe*] 23(1):73-78, 1974.

6998 INCIDENCE AND SIGNIFICANCE OF DELAYED INTESTINAL REACTIONS TO THERAPEUTIC RADIOTHERAPY IN PATIENTS WITH CERVICAL CARCINOMA AND TUMORS OF THE TESTES. *(Ger.)* Prager, W.; Taubert, W. (Dept. Med., Karl Marx Univ., Leipzig, Germany). *Wissenschaftl. Z. Karl Marx Univ.* [*Math. Naturwissenschaftl. Reihe*] 23(1):83-87, 1974.

6999 RADIATION REACTIONS OF THE INTESTINAL TRACT: CLINICAL OBSERVATIONS. *(Ger.)* Hartig, W.; Mlynek, H. J.; Strassburger, P.; Engel, C. (Dept. Med., Karl Marx Univ., Leipzig, Germany). *Wissenschaftl. Z. Karl Marx Univ.* [*Math. Naturwissenschaftl. Reihe*] 23(1):88-91, 1974.

7000 CLINICAL ASPECTS OF RADIATION-INDUCED CHANGES IN THE TERMINAL LARGE INTESTINE IN GYNECOLOGICAL PATIENTS. *(Ger.)* Holtzhauer, R. (Dept. Med., Friedrich Schiller Univ., Jena, Germany *Wissenschaftl. Z. Karl Marx Univ.* [*Math. Naturwissenschaftl. Reihe*] 23(1):92-94, 1974.

01 SOME ASPECTS OF RECTAL RADIATION DAMAGE IN RADIOTHERAPY OF CERVICAL CARCINOMA. *(Ger.)*
trov, G.; Pentschev, P. (Ctr. Oncol., Sofia, Bul-
ria). *Wissenschaftl. Z. Karl Marx Univ.* [*Math.*
turwissenschaftl. Reihe] 23(1):95-98, 1974.

02 RADIATION TOLERANCE OF THE RECTUM. *(Ger.)*
Groszmann, H. (Reg. Hosp., Karl Marx
adt, Germany). *Wissenschaftl. Z. Karl Marx Univ.*
ath. Naturwissenschaftl. Reihe] 23(1):99-101,
74.

7003 CARCINOID TUMORS: LITERATURE REVIEW AND NEW CASES. *(Sp.)* Jofre Gutierrez, J. A.; Bianchi, M. L.; Serra, D. E.; Oliva Otero, G. (Fac. Med. Sci., Natl. Univ. Cuyo, Mendoza, Argentina). *Rev. Esp. Enferm. Apar. Dig.* 43(2):153-164, 1974.

See also, 6735, 6741, 6795, 6797, 6799, 6806, 6923, 6932, 6940, 6962, 7011, 7250, 7298, 7308, 7314, 7332.

LARGE INTESTINE

Ulcerative Colitis

04 DIFFERENTIAL DIAGNOSIS OF ULCERATIVE AND GRANULOMATOUS COLITIS BY SIGMOIDOSCOPY,
CTAL BIOPSY AND CELL COUNTS OF RECTAL MUCOSA. *(E.)*
relitz, B. I.; Sommers, S. C. (Mt. Sinai Sch. Med.,
w York, N.Y.). *Am. J. Gastroenterol.* 61(6):460-
9, 1974.

er a 5 yr period, 365 patients with inflammatory
wel disease were classified into 7 categories on
e basis of radiological findings supplemented by
story and clinical data: ulcerative colitis, sig-
oidoscopy positive (155); sigmoidoscopy negative
2); granulomatous colitis or ileocolitis, sigmoi-
oscopy positive (44); sigmoidoscopy negative (54);
eitis or jejunitis (13); colitis type undetermined
5); and possible colitis (12). The histopatholo-
c features of sigmoidoscopically positive ulcera-
ve and granulomatous colitis demonstrated no sig-
ficant differences. Therefore, differentiation
ould rely on clinical, radiologic, and sigmoido-
copic results unless a granuloma is found. Cell
unts of sigmoidoscopically positive ulcerative
litis showed significantly more pyknotic epithe-
al cells, while lamina propria connective tissue
lls demonstrated no significant differences between
cerative and granulomatous types. In the ulcera-
ve type of colitis with negative sigmoidoscopy,
ere were significantly more mast cells, plasma
lls, eosinophils and neutrophils in connective
ssue cell counts, but more macrophages in the
anulomatous type. In general, when sigmoidoscopic
pearance is normal (i.e., negative) or becomes so
ter inflammation subsides, connective tissue cell
unts have shown significant differences useful to
stinguish ulcerative from granulomatous colitis.
ed together with rectal examinations, the combina-
on of gross sigmoidoscopic appearance and cell
unts of rectal biopsies appears to provide the best
fferential diagnostic criteria.

05 ULCERATIVE COLITIS IN PREGNANCY. *(E.)*
McEwan, H. P. (Roy. Maternity Hosp., Glas-
w, Scotland). *Med. Chir. Dig.* 2(6):355-358, 1973.

e effects of ulcerative colitis on pregnancy and
ce versa were examined in 38 medically treated
men with 50 pregnancies, 9 women undergoing surgery antenatally or immediately postpartum, and 11 pregnant women with surgical treatment of the disease previous to pregnancy. In the 38 medically treated women, no neonatal deaths, maternal deaths, or fetal abnormalities occurred. Mode of delivery was abortion in 5 cases (4 spontaneous and 1 therapeutic), 41 vaginal deliveries (1 stillbirth), and 4 cesarean sections. In general, the outcome of pregnancies was good; but if the colitis was severe, the pregnancy was endangered and abortion a possibility. On the other hand, the course of mild or inactive ulcerative colitis was not greatly influenced by pregnancy. Surgery during pregnancy in 9 cases showed a poor outcome with only 5 live births and with 3 maternal deaths, 2 during pregnancy and 1 *in puerperium*. Twelve pregnancies in 11 patients after surgery prior to pregnancy were terminated by 9 vaginal deliveries and 3 cesarean sections (with 1 maternal death due to unrelated causes), all with successful fetal outcome. Results indicate that ulcerative colitis in its mild form or in the inactive phase does not contraindicate pregnancy. If active, avoidance of pregnancy is desirable since surgical treatment is associated with a high maternal death rate and infant loss.

7006 ULCERATIVE COLITIS AND ENTEROCOCCI. *(E.)*
Van der Wiel-Korstanje, J. A. A. (Microbiol. Lab., State Univ., Utrecht, Netherlands). *Antonie van Leeuwenhoek* 40(2):325, 1974.

In 13 patients with ulcerative colitis and in 25 normal subjects of comparable age, the number of enterococci/g feces was counted regularly for several weeks or months. All isolated strains belonged to the serological group D and could be identified biochemically as *Streptococcus faecalis*, *S. faecium*, *S. bovis*, *S. mobilis*, and the so-called Q streptococci. In normal subjects, the number of enterococci varied between 10^5 and 10^7/g feces, with generally only 1 or 2 species present in each sample; *S. mobilis* was never found. In patients with ulcerative colitis, the number of enterococci ranged between 10^7 and 10^9/g feces; the number of species/sample was higher; and *S. mobilis* occurred frequently. About 50% of the strains of *S. faecalis*, *S. faecium*, and Q streptococci produced a mucinase, compared with 85% of the *S. mobilis* strains.

Most of the strains from patients produced a hyaluronidase. Some strains formed lactic acid from mucin, hyaluronic acid, N-acetylneuraminic acid, and N-acetylglucosamine. It is theorized that the large amount of mucus in diseased bowels stimulates the growth of enterococci, especially *S. mobilis*, and that hyaluronic acid released from the ulcerations is another growth-promoting factor. The lactic acid in the feces of ulcerative colitis patients is apparently related to the 100-fold increase of enterococci and for the most part may be considered as the metabolic end product of mucus breakdown.

7007 MITIGATION OF EXPERIMENTAL INFLAMMATORY BOWEL DISEASE IN GUINEA PIGS BY SELECTIVE ELIMINATION OF THE AEROBIC GRAM-NEGATIVE INTESTINAL MICROFLORA. *(E.)* Van der Waaij, D.; Cohen, B. J.; Anver, M. R. (Animal Res. Facility, Univ. Michigan, Ann Arbor). *Gastroenterology* 67(3):460-472, 1974.

The effect of selective elimination of the aerobic gram-negative intestinal flora on the development of experimental bowel disease was studied in male English short-hair albino guinea pigs. Lesions were induced with 2 or 5% degraded carrageenan administered in the drinking water for 30 to 44 days. Craterous cecal or colonic ulcers, crypt abscesses, mucosal distortion, mesenteric lymphadenopathy, marked cecal or colonic lymphoid hyperplasia, and other lesions were seen in conventional guinea pigs treated with degraded carrageenan. Other guinea pigs that were treated with 2% degraded carrageenan, but freed of Enterobacteriaceae species by the administration of trimethoprim with sulfamethoxazole, and subsequently maintained in isolators, exhibited virtually no lesions. Enterobacteriaceae-free animals that were treated with 5% degraded carrageenan had significantly fewer lesions than were observed in the conventional degraded carrageenan-treated animals. Biotyping of bacterial isolates indicated that Enterobacteriaceae species generally, and not a single biotype, were associated with the lesions. The bacteria presumably stimulated an immunological response after penetration of the intestinal mucosal barrier. Thus, inflammatory bowel disease in guinea pigs, induced with degraded carrageenan, may provide a useful model for investigating immunological aspects of human inflammatory bowel disease.

7008 TITRE OF ANTI-E. coli ANTIBODIES IN ULCERATIVE COLITIS. *(E.)* Kovacs, A. (Semmelweis Univ. Med. Sch., Budapest, Hungary). *Digestion* 10(3):205-209, 1974.

The antibody titers against *Escherichia coli* 0:14 were determined with an hemagglutination method in the serum of 65 patients with ulcerative colitis, of 20 patients with other intestinal diseases, and of 35 patients with diseases of other organ systems. High antibody titers, found in 3 patients with active ulcerative colitis, decreased when the patients became asymptomatic. No significant difference was observed between the groups of patients. These results, which contradict previously published data, do not support the view that *E. coli* plays an important role in the pathogenesis of ulcerative colitis.

7009 ULCERATIVE DISEASE OF THE COLON IN LABORATORY ANIMALS INDUCED BY PEPSIN INHIBITORS. *(E.)* Marcus, R.; Watt, J. (Clatterbridge Hosp., Bebington, England). *Gastroenterology* 67(3):473-483, 1974.

The administration of pepsin inhibitors, sodium lignosulfonate, or sulfated amylopectin in low concentration (1%) in the drinking fluid to guinea pigs and rabbits over a 2 to 6 week period caused ulcerative disease of the colon in 50-100% of the animals. These doses are comparable to therapeutic doses used clinically. The clinical and morphological features were very similar to ulcerative disease of the colon induced by carrageenan. Animals had diarrhea which varied in severity; occult or, in some cases, visible blood in the feces; and either weight loss or failure to gain weight. Morphological features included multiple focal ulceration in the cecal mucosa with extension distally into the colon and rectum; focal cellular aggregates, including macrophages, in the mucosa; cystic dilatation of the mucosal glands; and crypt abscesses. Careful toxicity tests and evaluation of the potential hazards of pepsin inhibitors are necessary before releasing such preparations for therapeutic use.

7010 "PRECANCER" LESIONS IN ULCERATIVE COLITIS: A RETROSPECTIVE STUDY OF RECTAL BIOPSY AND COLECTOMY SPECIMENS. *(E.)* Yardley, J. H.; Keren, D. F. (Johns Hopkins Hosp., Baltimore, Md.). *Cancer* 34(3)suppl.:835-844, 1974.

To further define and determine the occurrence of precancerous lesions in patients with ulcerative colitis, 41 colectomy specimens and 412 rectal biopsies from 204 patients with ulcerative colitis were studied. Seven of 8 resected specimens containing carcinomas also showed flat or adenomatous mucosal lesions, characterized by the marked epithelial atypia, villous change, and reduced epithelial mucus content indicative of precancer. Similar precancerous changes were found in 3 of the 412 rectal biopsies studied: 2 of these patients had subsequent colectomy with invasive carcinoma. Diffuse precancerous changes throughout the colon in the form of multiple adenomas were found in the 3rd patient. It is concluded that precancerous changes are valid means for identifying the population of ulcerative colitis patients who have the highest risk of developing colonic carcinoma and that some of these individuals can be detected by examining rectal biopsies. However, active colitis artificially increased the number of biopsies showing changes suspicious of precancer, and precancer involving other parts of the colon can go undetected if only rectal biopsies are examined. The latter patients might be more successfully identified by using a combination of colonoscopy and biopsy at regular intervals.

RECTAL BIOPSY AND PRECANCER IN ULCERATIVE
COLITIS. *(E.)* Myrvold, H. E.; Kock, N.
hren, C. (Sahlgren Hosp., Univ. Goteborg, Swe-
Gut 15(4):301-304, 1974.

l biopsies and colectomy specimens were obtain-
om 47 ulcerative colitis patients with involve-
of the entire large intestine. They underwent
ive proctocolectomy and were investigated for
rence of reactive cellular atypia and precancer-
hanges. In 24 patients no precancer or cellular
a was found in rectal biopsies, but operative
mens showed cellular atypia in 9 and precancer-
hanges in 1. Of 16 patients with cellular atypia
ctal biopsy, 10 had precancer in operative spec-
. In only 7 patients was precancer found in both
l biopsies and operative specimens; 5 of the 7
had carcinoma. In operative specimens the whole
s membrane showed precancerous changes in 2 cases
atchy distribution of the lesion in the rest.
atients with no precancer in the rectum of oper-
specimens had precancer at other sites in the
. Precancer and carcinoma were found, resp., in
nd 6% of 35 operative specimens from patients
ulcerative colitis for less than 10 yr. The fact
precancer is in most cases patchy and in some
does not involve the rectum limits the useful-
of rectal biopsy in patients with ulcerative
tis. However, biopsies can be of value in select-
atients for operation. Thus in all 7 patients
precancer in the rectal biopsy, precancer or pre-
r associated with carcinoma was found in the col-
y specimen. The results also indicate that pa-
s with a short history of ulcerative colitis are
at risk of developing carcinoma than has been
ed.

TISSUE CYTOGENETIC STUDIES IN CHRONIC ULCER-
ATIVE COLITIS AND CARCINOMA OF THE COLON.
Xavier, R. G.; Prolla, J. C.; Bemvenuti, G. A.;
ner, J. B. (Dept. Med., Univ. Chicago, Ill.).
r 34(3):684-695, 1974.

genetic studies were conducted on rectal mucosal
from patients with Crohn's disease, ulcerative
tis, and colonic carcinoma. Cytogenetic prepara-
were obtained by brushing the rectal mucosa
g proctoscopy. Of 61 individuals examined, 33
ided reliable material for chromosomal analysis:
rmal controls, 5 with Crohn's disease involving
colon, 10 with chronic ulcerative colitis, 4
ulcerative colitis complicated by cancer of the
in whom special care was taken to obtain separ-
samples from both colitic and cancerous tissue,
with cancer of the colon alone. Chromosome
and karyotypes were normal in all controls and
ents with Crohn's disease. In chronic ulcera-
colitis the modal chromosome number remained
e diploid range, but aneuploid, or possibly
en polyploid cells were seen in 2 patients, and
e inflamed mucosa of 2 other patients with can-
of the colon associated with ulcerative colitis.
these cells were in the hypotetraploid range.
hromatid breaks were found in the controls and
atients with Crohn's disease, but patients with
rative colitis and colon cancer demonstrated a
variable number of breaks. Profound abnormalities were detected in patients with carcinoma: aneuploidy, chromatid breaks, and marker chromosomes.

7013 CELL IMMUNITY REACTIONS IN ULCERATIVE COLITIS. *(Cz.)* Fixa, B.; Komarkova, O. (Med. Fac., Charles Univ. Hradec Kralove, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 28(2):95-99, 1974.

7014 DIFFERENTIAL DIAGNOSIS OF DIVERTICULITIS AND GRANULOMATOUS COLITIS. EXACERBATION OF GRANULOMATOUS COLITIS AFTER SIGMOID RESECTION. *(E.)* Gelb, A. M.; Finkelstein, W. E. (French, Polyclin. Med. Sch., New York, N.Y.). *Am. J. Gastroenterol.* 62(1):9-15, 1974.

7015 ULCERATIVE COLITIS ASSOCIATED WITH SKIN AND HAIR CHANGES. *(E.)* Allen, H. B.; Moschella, S. L. (Naval Hosp., Philadelphia, Pa.). *Cutis* 14(1):85-92, 1974.

7016 ILEOSTOMY AND ITS PLACE IN SURGICAL TREATMENT OF NONSPECIFIC ULCERATIVE PROCTOCOLITIS. *(Rus.)* Litvinenko, M. D. (Kuban Med. Inst., Krasnodar, USSR). *Vestn. Khir.* 112(2):58-63, 1974.

7017 HEPATOMA ASSOCIATED WITH ULCERATIVE COLITIS. REPORT OF A CASE. *(E.)* Smith, P. M. (Llandough Hosp., Glamorgan, Wales). *Dis. Colon Rectum* 17(4):554-556, 1974.

7018 ULCERATIVE COLOTIS, COLITIC SPONDYLITIS AND ASSOCIATED APICAL PULMONARY FIBROSIS. *(E.)* Meadway, J. (Tindall Gen. Hosp., Aylesbury, Buckinghamshire, England). *Proc. R. Soc. Med.* 67(5):324-325, 1974.

7019 ULCERATIVE COLITIS, AUTOIMMUNE EPIPHENOMENA, AND COLONIC CANCER. *(E.)* Watson, D. W. (Dept. Internal Med., Univ. California, Davis). *Cancer* 34(3):867-871, 1974.

See also, 6735.

7020 ELECTRON MICROSCOPY OF SMALL INTESTINAL MUCOSA IN PANCREATIC INSUFFICIENCY. *(E.)* Shimoda, S. S.; Saunders, D. R.; Schuffler, M. D.; Leinbach, G. L. (Dept. Med., Univ. Washington, Seattle). *Gastroenterology* 67(1):19-27, 1974.

Fat absorption was investigated in 4 patients with pancreatic insufficiency. Jejunal contents were analyzed chemically, and jejunal mucosal biopsies were studied with an electron microscope after intragastric infusion of test meals over 15 min. Lipolytic activity was low in postprandial jejunal contents; lipolysis of the test meal was reduced, but 2 mM free fatty acid was solubilized in the aqueous phase of intestinal contents. In spite of these appreciable quantities of solubilized free fatty acids, no evidence of fat absorption was detected morphologically. Electron microscope study revealed that essentially no visible fat particles entered or left the jejunal absorptive cells for up to 2 hr after a fatty meal. Lipolysis, and the number of fat droplets in absorptive cells, could be normalized by adding 5 g of pancreatic enzymes to the test meal, indicating that there was no intrinsic mucosal defect. Fat absorption was also morphologically normal after feeding a predigested meal whose enzymes were inactivated, suggesting that pancreatic enzymes did not play a major role in enhancing absorption of solubilized free fatty acid. Lipolysis was low and mucosal fat droplets were absent in the proximal ileum, indicating that digestion and absorption of the test meal were not occurring in the distal small intestine. Despite absent morphological evidence of fat absorption, patients absorbed 30 to 70% of their dietary fat. It is possible that in pancreatic insufficiency, fatty acids enter and leave the absorptive cells as monomers, or as small aggregates which are not detected by present electron microscopic techniques.

7021 NEW ONCOFETAL ANTIGEN FOR HUMAN PANCREAS. *(E.)* Banwo, O.; Versey, J.; Hobbs, J. R. (Westminster Hosp. Med. Sch., London, England). *Lancet* 1(7859):643-645, 1974.

In a search for fetal pancreas proteins that can specifically identify neoplasm of the pancreas and that are not present in adult pancreas but are found in the blood of patients with pancreatic tumors, antisera against stabilized homogenates of whole human fetal pancreas were raised in rabbits and absorbed with normal adult pancreas and albumin. By 2-dimensional immunoelectrophoresis in agarose containing antiproteases, a characteristic peak was shown in sera from 36 of 37 patients with carcinoma of the pancreas. It was also found against extracts of fetal pancreas or adult pancreatic carcinoma. It was absent from sera of 38 other patients, including those with gut cancers (8 positive for colonic carcinoembryonic antigen); hepatoma (2 positive for α-fetoprotein); other causes of jaundice (11); and acute (5) or chronic (12) pancreatitis. It was absent in extracts of fetal colon and fetal liver. Thus far the adsorbed antisera seem to detect an oncofetal antigen complex specific to pancreas since it has been identified only in fetal pancreas or in adult pancreatic carcinoma, and is distinct from th 3 known occofetal antigens. Until it has been isolated and purified, and until a radioimmunoassay ha been established, the full extent of its applicability remains unknown.

7022 FAMILIAL HYPERLIPOPROTEINAEMIA AND THE EXOCRINE PANCREAS. *(E.)* Herfort, K.; Sobra, J.; Heyrovsky, A. (Fac. Gen. Med., Charles Univ., Prague, Czechoslovakia). *Rev. Czech. Med.* 19(4):230-237, 1973.

Of 37 patients (16 men and 20 women; mean age, 40. yr) with familial hyperlipoproteinemia, 17 (45.9%) experienced attacks of epigastric pain of pancreati origin. The pain was spastic, usually very intense and generally persisted for several days. Accordin to Frederickson's classification, these patients ha types I, IV, and V familial hyperlipoproteinemia. The pain did not occur in type II or III patients. Exocrine pancreatic secretion was impaired in 27 patients (72.9%), including 17 who had attacks of epigastric pain and 10 who did not. The most frequent finding was a reduced lipase output (70.2%), followed by a reduction of the bicarbonate output (62.1%) maximum bicarbonate concentration (59.5%), and volu (37.8%). Amylase output was reduced in only 29.7%. Three or more parameters of pancreatic secretion we reduced in the 2 patients with type I, in 8 of 17 with type IV, and in 5 of 9 with type V hyperlipopr teinemia. None of the patients with types II and I had 3 or more abnormalities in parameters for pancr atic exocrine secretion. It is possible that lipid abnormalities characteristic of types I, IV, and V familial hyperlipoproteinemia are only one manifest tion of the inborn defect in lipid metabolism. Sin there is no evidence that these lipid abnormalities alone cause changes in the exocrine pancreas, anoth manifestation could be a defect in the enzyme makeu of acinar cells which results in the clinical symptoms and functional changes observed in these patients. Impaired pancreatic secretion in asymptomatic patients with familial hyperlipoproteinemia suggests that lipoprotein abnormalities precede and ma participate in the development of impaired pancreat function, e.g. acute or chronic pancreatitis.

7023 REPRODUCIBILITY OF THE RESPONSE TO SECRETIN AND SECRETIN PLUS PANCREOZYMIN IN MAN *(E.)* Tympner, F.; Domschke, S.; Domschke, W.; Classen, M.; Demling, L. (Dept. Med., Univ. Erlangen, Germany). *Scand. J. Gastroenterol.* 9(4):377-381, 1974.

7024 PANCREATIC ACINAR CELL CARCINOMA IN CHIL HOOD. *(E.)* Mah, P. T.; Loo, D. C.; Tock E. P. C. (Dept. Pathol., Univ. Singapore). *Am. J. Dis. Child.* 128(1):101-104, 1974.

7025 CARCINOMA OF THE PANCREAS. *(E.)* Sharma, G. C.; Vickers, P. (Med. Coll. Hosp., Jaipur, India). *Int. Surg.* 59(5):282-285, 1974.

26 FUNCTIONAL STUDIES OF THE PAROTID AND PANCREAS GLANDS IN AMYOTROPHIC LATERAL SCLER-
IS. *(E.)* Charchaflie, R. J.; Bustos Fernandez,
; Perec, C. J.; Gonzalez, E.; Marzi, A. (Fac. Med.,
iv. Buenos Aires, Argentina). *J. Neurol. Neuro-*
rg. Psychiatry 37(7):863-867, 1974.

27 RECENT ADVANCES IN PANCREATIC CANCER. *(E.)* Fortner, J. G. (Mem. Sloan-Kettering Cancer
r., New York, N.Y.). *Surg. Clin. North Am.* 54(4):
9-863, 1974.

28 PANCREATIC NEUROFIBROMA. *(Fr.)* Jackiewicz, Z.; Lasek, J.; Dybicki, J. (Acad.
d., Gdansk, Poland). *Lyon Chir.* 70(3):208-209,
74.

29 NONPENETRATING PANCREATIC TRAUMA. *(Fr.)* Milani, H.; Burny, F. (A. Gailly I.M.C.,
arleroi, Belgium). *Acta Chir. Belg.* 73(1):5-22,
74.

7030 CARCINOID SYNDROME DUE TO ANAPLASTIC CARCINOMA OF THE PANCREAS. *(Ger.)* Loewe, U.; Hoer, P. W. (Fac. Clin. Med., Mannheim, Germany). *Klin. Wochenschr.* 52(6):283-287, 1974.

7031 EXOCRINE PANCREATIC FUNCTION IN ACUTE GASTROINTESTINAL DISEASE IN YOUNG CHILDREN. *(Ukr.)* Mykhnovs'ka, K. H.; Balezina, T. A. (Kiev Sci. Res. Inst. Pediatr. Obstet. Gynecol., USSR). *Pediatr. Akush. Ginekol.* 36(1):22-23, 1974.

See also, 6789, 6790, 6798, 6817, 7042, 7167, 7203, 7205.

PANCREAS

Pancreatitis

32 ACUTE HEMORRHAGIC PANCREATITIS AND PSEUDOCYST DUE TO MUMPS. *(E.)* Feldstein, J. D.;
hnson, F. R.; Kallick, C. A.; Doolas, A. (Rush Pres-
terian St. Luke's Med. Ctr., Chicago, Ill.). *Ann.*
rg. 180(1):85-88, 1974.

mps hemorrhagic pancreatitis was documented in a 4-
old boy with a history of exposure to mumps paroti-
is. Signs and symptoms at admission included shock,
igastric pain, and slight bilateral parotid swelling.
ver the next 36 hr, the abdomen became more tender
nd distended. A flat plate of the abdomen revealed
sentinel loop of distended bowel and a diffuse hazi-
ess. Rectal temperature rose to 39.5 C. Serum amyl-
se was 680-816 U and an abdominal tap revealed san-
uinous fluid with 7600 U amylase. Abdominal surgery
evealed a necrotic, hemorrhagic, and grossly edematous pancreas; the omentum and mesentery exhibited
iffuse areas of saponification, necrosis, and hemor-
hage. A total of 2000 ml of serosanguinous fluid
as drained. After the patient pulled out his drains
days later, re-exploration showed a large pancreatic
seudocyst which was drained into a jejunal Roux-en-y
oop. Recovery was uneventful. During 4 weeks test-
ng, mumps titers showed a 4-fold increase in virus
iters, indicative of recent mumps infection. When
urgery is indicated for hemorrhagic pancreatitis,
rainage of the lesser sac usually prevents pseudo-
yst formation; if a pseudocyst does occur, drainage
s required to eliminate disabling pain and chronic
ancreatitis. Live attenuated mumps vaccine, now
vailable for immunizing school age children, may
liminate this source of pancreatitis.

7033 CHARACTERIZATION OF AN ADDITIONAL PROTEIN IN PANCREATIC JUICE OF MEN WITH CHRONIC CALCIFYING PANCREATITIS: IDENTIFICATION TO LACTOFERRIN. *(E.)* Colomb, E.; Estevenon, J. P.; Figarella, C.; Guy, O.; Sarles, H. (Unit Res. Dig. Pathol., INSERM, Marseille, France). *Biochem. Biophys. Acta.* 342(2):306-312, 1974.

The protein composition of normal pancreatic juice and pancreatic juice from men with chronic calcifying pancreatitis was compared using immunological techniques. An additional protein, missing in normal pancreatic juice, was demonstrated in 6 pathological pancreatic juice samples assayed against antiserum treated with soluble antigens to precipitate antigen-antibody complexes. This protein was weakly anionic at pH 8.6, had a molecular weight close to 69,000, and was immunologically identical to lactoferrin, an iron-binding protein present in various external secretions. Lactoferrin concentration in pancreatic juice, determined in 10 patients with chronic calcifying pancreatitis, was very low (0.03-0.34% of total proteins). No relation was found between alkaline phosphatase activity and lactoferrin presence in pathological pancreas juices. Therefore, lactoferrin in pancreatic juice is probably not due to a leukocyte contamination but is a component of the pancreatic secretion. As lactoferrin was present in normal serum at a very low level, it is hypothesized that lactoferrin in pathological pancreatic juice could result from selective transport of the protein from serum to pancreatic juice.

7034 PLASMA AND LEUKOCYTE ANTIHEPARIN ACTIVITY IN ACUTE EXPERIMENTAL PANCREATITIS. *(E.)* Prokopowicz, J.; Gabryelewicz, A. (Inst. Med., Bialystok, Poland). *Haematologia (Budap.)* 7(3-4): 375-379, 1973.

7035 PANCREATITIS OF MICE INFECTED WITH ENCEPHALOMYOCARDITIS VIRUS. *(E.)* Burch, G. E.; Tsui, C. Y.; Harb, J. M. (Tulane Univ. Sch. Med., New Orleans, La.). *Pathol. Microbiol. (Basel)* 40 (5):281-296, 1974.

7036 OBSERVATIONS ON ACUTE PANCREATITIS. *(E.)* Imrie, C. W. (Roy. Infirm., Glasgow, Scotland). *Br. J. Surg.* 61(7):539-544, 1974.

7037 THE OCCURRENCE OF ACUTE PANCREATITIS IN MYCOPLASMA PNEUMONIAE INFECTION. *(E.)* Mardh, P. A.; Ursing, B. (Univ. Hosp., Lund, Sweden). *Scand. J. Infect. Dis.* 6(4):167-171, 1974.

7038 RECENT ADVANCES IN THE MANAGEMENT OF CHRONIC PANCREATITIS. *(E.)* Stefanini, P. (Surg. Clin. II, Univ. Rome, Italy). *Rend. Gastroenterol.* 5(3):227-228, 1973.

7039 ETIOLOGICAL AND EPIDEMIOLOGICAL ASPECTS OF CHRONIC CALCIFYING PANCREATITIS IN ITALY. *(E.)* Gullo, L.; Fontana, G. (Inst. Pathol. Med. I, Bologna, Italy). *Rend. Gastroenterol.* 5(3):233, 1973.

7040 EPIDEMIOLOGICAL, CLINICAL, AND DIAGNOSTIC OBSERVATIONS ON 100 PATIENTS AFFECTED BY CHRONIC PANCREATITIS (1969-1972). *(E.)* Dobrilla, G.; Cavallini, G.; Vantini, I.; Angelini, G.; Mirachian, R.; Scuro, L. A. (Pathol. Med. Inst., Univ. Padova, Italy). *Rend. Gastroenterol.* 5(3):234, 1973.

7041 FIVE TO TWENTY YEAR FOLLOWUP AFTER SURGERY FOR CHRONIC PANCREATITIS IN 148 PATIENTS. *(E.)* Leger, L.; Lenriot, J. P.; Lemaigre, G. (Hosp. Cochin, Paris, France). *Ann. Surg.* 180(2):185-191, 1974.

7042 ACUTE TRAUMATIC PANCREATITIS. *(Fr.)* van den Spiegel, A.; Pieters, G.; de Meester, P. (Menzel-Bourguiba Main Hosp., Tunisia). *Acta Chir. Belg.* 72(1):60-67, 1973.

7043 PROBLEMS IN THE DIAGNOSIS AND TREATMENT OF TRAUMATIC PANCREATIC PSEUDOCYSTS IN CHILDREN. *(Ger.)* Geley, L. (Provincial Children's Hosp., Linz, Austria). *Wien. Med. Wochenschr.* 124 (25/26):389-393, 1974.

7044 BLOOD LIPID LEVELS IN ACUTE PANCREATITIS. *(Rus.)* Petrenko, V. V.; Ushakov, N. P.; Ismailov, A. Kh. (Blagoveshchensk Med. Inst., USSR). *Klin. Khir.* (8):85, 1973.

7045 EXTENSION OF PANCREATIC NECROSIS TO THE COLON: THREE CASES. *(Fr.)* Champetier, J.; Bouchet, Y.; Brabant, A.; Guignier, M.; Durand, A.; Charignon, G.; Corallo, J. (Hosp. Ctr., Grenoble, France). *Lyon Chir.* 70(3):196-198, 1974.

7046 ROLE OF LYMPHATIC OBSTRUCTION IN THE PROGRESSION OF ACUTE PANCREATIC INFLAMMATORY CHANGES. *(Sp.)* Gramatica, L.; Teyssedou, C.; Ceballos, A. G. (Fac. Med. Sci., Natl. Univ. Cordoba, Argentina). *Rev. Esp. Enferm. Apar. Dig.* 43(2):129-136, 1974.

7047 TREATMENT OF CHRONIC PANCREATITIS. *(Ger.)* Dietze, F.; Bruschke, G.; Schulz, H. J. (Dept. Med., Charite Hosp., Berlin, Germany). *Dtsch. Gesundheitsw.* 29(1):23-26, 1974.

7048 TREATMENT OF ACUTE PANCREATITIS WITH GLUCAGON. *(It.)* Visconti, W.; Grillo, N.; Chan, R. (G. B. Giustinian Reg. Geriatric Hosp., Italy). *Acta Chir. Ital.* 29(2):209-216, 1973.

7049 USE OF ε-AMINOCAPROIC ACID IN ACUTE PANCREATITIS AND CHOLECYSTOPANCREATITIS. *(Rus.)* Bhatta, A. D. (Khar'kov Med. Inst., USSR). *Klin. Khir.* (11):52-55, 1973.

See also, 6798, 6805, 6832, 6869, 6899, 7022, 7023, 7204, 7205, 7227, 7278.

LIVER AND BILIARY TRACT

7050 ^{67}GALLIUM SCANNING IN THE DIAGNOSIS OF LIVER DISEASE. *(E.)* James, O.; Wood, E. J.; Sherlock, S. (Roy. Free Hosp., London, England). *Gut* 15(5):404-410, 1974.

^{67}Gallium (^{67}Ga) citrate liver scans were made on 60 selected patients following a scan with a radioactiv colloid preparation. The ^{67}Ga scan correctly identified the site of primary liver carcinoma in 14 of 16 patients, including 9 of 10 patients in whom the carcinoma developed in a cirrhotic liver. In contrast, a colloid scan positively identified the site

only 4 of these 10 cirrhotic subjects. The α_1-
etoprotein test was positive in 8 of the 16 patients,
ncluding the 2 in whom the ^{67}Ga scan was negative.
positive ^{67}Ga scans were seen in 15 patients with
rrhosis in whom a space-occupying lesion could not
ruled out on the basis of a colloid scan. ^{67}Ga
trate scanning appears to be the most reliable
echnique available for diagnosing primary liver cell
ancer. Uptake of ^{67}Ga in secondary metastatic tu-
ors within the liver was less frequent, and this
ethod appears to have much less value in the detec-
ion of these metastases and of bile duct carcinoma
han of primary liver cell carcinoma. The ^{67}Ga scan
as positive in 6 out of 6 patients with pyogenic
bscess either in the liver or adjacent to it. In
of these patients a preceding colloid scan had
hown no definite filling defect in the liver. In
iew of the low incidence of false positive scans
nd of false negative results in selected patients,
Ga scanning is a valuable additional tool in the
iagnosis of liver disease.

051 GAMMA-GLUTAMYL-TRANSPEPTIDASE IN HEPATO-
BILIARY DISEASE. VALUE AS AN ENZYMATIC
IVER FUNCTION TEST. *(E.)* Cuschieri, A.; Baker, P.
. (Dept. Surg., Univ. Liverpool, England). *Br. J.*
cp. Pathol. 55(2):110-115, 1974.

e diagnostic and prognostic value of serum γ-
lutamyl-transpeptidase activity in hepatobiliary
isease was investigated in 52 patients, including
5 with alcoholic cirrhosis, 13 with cryptogenic
irrhosis, 6 with chronic active hepatitis, 12 with
xtrahepatic bile duct obstruction, 3 with primary
epatic neoplasm, and 2 with primary biliary cir-
hosis. Mean enzyme activity in the 29 cirrhotics
53.8 mU/ml) was significantly higher than in the
3 controls with normal liver function tests (14.8
U/ml). There was no significant difference between
lcoholic and cryptogenic cirrhosis. However, clas-
ification of all cirrhotic patients according to
egree of disease indicated that enzyme level de-
lined significantly with progress of the disease,
eaching very low values in terminal hepatic coma.
n the cirrhotic group as a whole, serum γ-glutamyl-
ranspeptidase activity was significantly correlated
ith serum albumin level. Enzyme activity was ele-
ated (240.6 mU/ml) in chronic active hepatitis, and
here was no significant difference in values during
elapse and remission. In biliary tract obstruction,
he serum γ-glutamyl-transpeptidase activity remained
levated (156.0 mU/ml) for up to 4-6 weeks after sur-
ery. Persistently high serum enzyme values (in ex-
ess of 200 mU/ml) were found in all patients with
rimary hepatic tumors and patients with primary
iliary cirrhosis. These 5 patients had a serum bili-
ubin above 8.0 mg/100 ml. The results suggest that
erum γ-glutamyl-transpeptidase is of diagnostic
alue in cirrhosis but is of limited use in monitor-
ng chronic hepatitis or in the follow-up of patients
fter biliary tract surgery.

052 PITFALLS IN THE ARTERIOGRAPHIC DIFFERENTIA-
TION OF INTRAHEPATIC AND EXTRAHEPATIC
ASSES. *(E.)* Shanser, J. D.; Glickman, M. G.;
Palubinskas, A. J. (Univ. California Sch. Med., San Francisco). *Am. J. Roentgenol. Radium. Ther. Nucl. Med.* 121(2):420-429, 1974.

Case reports are presented for 5 patients, all of whom had clinical evidence of an intrahepatic mass and 4 of whom had liver scans compatible with an intrahepatic mass. At surgery the diagnoses established were (1) carcinoma of the right adrenal gland with no gross or microscopic evidence of hepatic invasion; (2) a benign adrenal cyst which compressed the liver against the anterior abdominal wall; (3) a retroperitoneal metastasis from Wilm's tumor which did not involve the liver; (4) a cystic hypernephroma beneath a stretched and thinned right lobe of liver; and (5) a pancreatic pseudocyst situated behind the left lobe of the liver. Since these lesions were avascular or poorly vascularized and were directly superimposed upon the liver in the anteroposterior projection, arteriographic findings were inadequate to distinguish between intra- and extrahepatic masses. Despite the extrahepatic location of these lesions, intrahepatic arterial branches were stretched and attenuated. Identification of a "feeding" vessel was not possible because of the relatively avascular nature of these lesions. The extrahepatic location of 2 of these 5 masses was made by angiography by injecting the artery supplying the organ of origin of the mass. Abnormalities relating to the mass in arteries of the organ of origin indicated the correct diagnosis. It is suggested that a false-positive diagnosis of an intrahepatic mass can sometimes be avoided by careful analysis of intrahepatic arteries and by taking additional oblique or lateral projections, whichever is more tangential to the site of compression. Suspicion of the possible extrahepatic location of the mass should promote further investigation by intercostal, adrenal, pancreatic, or right renal arteriography.

7053 EFFECT OF ONE MEAL ON ENTEROHEPATIC CIRCULATION OF BILE SALTS. *(E.)* Low-Beer, T. S.; Wilkins, R. M.; Lack, L.; Tyor, M. P. (Duke Univ. Med. Ctr., Durham, N.C.). *Gastroenterology* 67(3):490-497, 1974.

The degree of interruption of the enterohepatic circulation of bile salts was studied in 7 patients (4 women and 3 men, aged 27-49 yr) with bile salt malabsorption after ileal resection with a double isotope method to circumvent the absence of steady-state conditions. All patients had undergone resections of the distal 1/3 to 1/2 of the ileum together with the ileocecal valve and, in most cases, the cecum and ascending colon. Measurements were made of the proportion of isotopically labeled pool of glycocholate and glycochenodeoxycholate present before a standard evening meal which was still present in fasting bile the following morning. In patients the proportion of glycocholate returned to the liver and biliary system *via* the enterohepatic circulation during this period averaged 5.8% of that returned by controls, while the equivalent value for glycochenodeoxycholate was 2.3%. The remaining small bowel of patients who had undergone ileal resection appeared unable to contribute significantly in maintaining enterohepatic circulation of conjugated bile salts. The bulk of such salts found in the gallbladder before breakfast had been synthesized overnight.

7054 THE LIVER IN AMYLOIDOSIS. *(E.)* Levy, M.; Polliack, A.; Lender, M.; Eliakim, M. (Hadassah Univ. Hosp., Jerusalem, Israel). *Digestion* 10(1):40-51, 1974.

A study was made of 21 patients with histological proof of hepatic amyloidosis (12 females and 9 males, aged 16-83 yr) in an effort to make diagnosis of this condition easier. In these 21 cases, diagnosis was established by autopsy in 17 cases and by liver biopsy in 4. The most consistent clinical finding was hepatomegaly and the most frequent laboratory feature was proteinuria due to associated renal amyloidosis. Electrocardiographic abnormalities and edema were found in more than 1/2 the cases, while clinical splenomegaly was encountered in 1/3. Ascites was rare and jaundice was unusual. Hypoalbuminuria, hyperglobulinemia, and high serum alkaline phosphatase were usually present. Clinical estimation of the size of the liver proved unreliable. Splenomegaly was detected clinically in 8 of the patients; however, at autopsy splenic amyloidosis was discovered in 82% and splenomegaly in 71% of the cases with an equal distribution among patients with primary and secondary amyloidosis. It is stressed that amyloidosis of the liver did not cause marked biochemical alterations in liver function. Serum vitamin B_{12} levels were measured in 3 patients and were elevated in all. It is concluded that the differentiation of 2 clinical syndromes of hepatic amyloidosis should be based on the histologic classification into intralobular and portal amyloidosis as opposed to the classification into primary and secondary forms. Intralobular and portal amyloidosis occurred equally among primary and secondary types. The former, less frequent, was associated with massive hepatosplenomegaly, cardiac involvement, ascites (all cases), and renal involvement (3 of 4 cases). The patients with highest serum alkaline phosphatase levels and the patient with severe jaundice were encountered in this group. The only death due to liver amyloidosis also had intralobular amyloidosis.

7055 GENETIC ASPECTS OF THE Pi SYSTEM. *(E.)* Cook, P. J. L. (Galton Lab., Univ. Coll. London, England). *Postgrad. Med. J.* 50(584):362-364, 1974.

Starch gel electrophoresis has shown that the plasma protein α_1-antitrypsin is polymorphic. At present 19 different alleles are known which are inherited in an autosomal pattern and constitute the Pi system. In the phenotype Pi ZZ, there is a virtual deficiency of plasma α_1-antitrypsin. About 1 baby in 3460 is born with α_1-antitrypsin deficiency, so about 230 such babies are expected in England and Wales each yr. Although an association between the deficiency and neonatal liver disease has been reported, not more than 10-15% of such babies should have liver disease. Of 26 Pi ZZ individuals who presented with out liver disease, none had a history of jaundice ar none had lost siblings in childhood due to liver disease.

7056 LECITHIN:CHOLESTEROL ACYLTRANSFERASE IN HUMAN LIVER DISEASE. *(E.)* Simon, J. B. (Dept. Med., Queen's Univ., Kingston, Canada). *Scand. J. Clin. Lab. Invest.* 33(Suppl 137):107-113, 1974.

Serum lecithin:cholesterol acyltransferase (LCAT) activity in 43 patients with parenchymal liver disease was assayed with autologous substrate. About 1/2 of the patients had active alcoholic disease, 1/3 viral hepatitis, and the rest various other parenchymal disorders. Esterifying activity ranged from undetectable to normal and averaged 10.4 μg/ml/ hr compared with 27.4 μg/ml/hr in 23 normal patients Of 15 patients with LCAT activity less than 5 μg/ml/ hr, 8 died within a week, while there were no deaths among those with higher activity. There was a negative correlation between LCAT and bilirubin, and in patients with hepatitis an inverse correlation between LCAT and SGOT. The data support the concept that low esterifying activity in liver disease reflects the overall severity of the hepatocellular dysfunction. In 23 patients simultaneous assays wit autologous substrate and with substrate prepared fr normal serum yielded identical LCAT values, indicating that abnormal substrate lipoproteins are not an important factor in decreased cholesterol esterification in hepatocellular disease. A comparison wa also made between LCAT activity in 12 patients with parenchymal liver disease and 6 patients with biliar obstruction. The results were in close agreement, whether measured by the method of Simon and Scheig or the method of Stokle and Norum. Although it has been claimed that combined determinations of LCAT and lipoprotein-X could differentiate between intrahepatic and extrahepatic cholestasis, recent data do not support this hypothesis.

7057 NEONATAL HEPATITIS SYNDROME AND ALPHA-1-ANTITRYPSIN DEFICIENCY: AN EPIDEMIOLOGIC STUDY IN SOUTH-EAST ENGLAND. *(E.)* Cottrall, K.; Cook, P. J. L.; Mowat, A. P. (King's Coll. Hosp. Med Sch., London, England). *Postgrad. Med. J.* 50(584): 376-380, 1974.

Of 100 cases of neonatal hepatitis syndrome observed over a period of 2 yr and 8 months, 21 patients had biliary atresia at laparotomy, 14 had hepatitis B antigen or antibody, and 13 had α_1-antitrypsin deficiency (Pi ZZ phenotype). In 49 cases no etiologi cal or associated factor was identified. All 13 patients (aged 7 months to 6 1/2 yr) with α_1-antitryps deficiency presented with jaundice, pale stools, and dark urine. Maximum recorded bilirubin ranged from 2-16 mg%. The jaundice persisted from 2 weeks to 6 months, and clearance was accompanied by raised seru aspartate transaminases and alkaline phosphatase.

4 of the 13 had hepatitis B antigen. Nine child-
re now clinically well, but 4 developed cirrho-
y age 1 yr and 2 of these have died. Maximal
malities of liver function tests were found in
patients with early onset of cirrhosis. Addi-
lly, age at onset of jaundice (2-10 days) and
uration (4-6 months) was longer in the 4 child-
eveloping cirrhosis by age 1 yr. In the 9 mild-
fected children, age at onset was 4-60 days, and
aundice persisted for 0.5-4 months. The patho-
al changes seen on liver biopsy in the first 6
s of life did not reflect the clinical course of
acute hepatitis in children with α_1-antitrypsin
iency. Four of the 9 mildly affected children
ave fibrosis on biopsy and a 5th has cirrhosis.
6 of the 48 patients with no identifiable etio-
al factor have evidence of fibrosis or cirrhosis
ver biopsy, as opposed to 8 of the 13 with α_1-
rypsin deficiency. The data indicate a poorer
osis for neonatal hepatitis patients with Pi ZZ
type than for patients with normal α_1-antitrypsin.

LIVER PHOSPHORYLASE DEFICIENCY IN GLYCOGENOSIS TYPE VI: DOCUMENTATION BY BIOCHEM-ANALYSIS OF HEPATIC BIOPSY SPECIMENS. *(E.)*

G.; Chuck, G.; Walling, L.; Schubert, W. K.
. Cincinnati Coll. Med., Ohio). *J. Lab. Clin.*
84(1):26-35, 1974.

and a girl (aged 4 and 7 1/2 yr, resp.) with
tomatic hepatomegaly demonstrated no hypergly-
response to epinephrine or glucagon, an ele-
n of SGOT and SGPT, and an increased concentra-
of hepatic glycogen, as well as a frayed appear-
of hepatic α-glycogen particles, and less than
f normal liver phosphorylase activity. In the
liver phosphorylase kinase activity was also
ed. Both children gave no evidence of a tumor
either had signs of hypoglycemia, acidosis,
ice, neurologic deficit, or muscle weakness.
of a diagrammatic scheme of the enzymatic cas-
in phosphorylase activation and deactivation
ciated with the interconversion of the active
nactive forms of this enzyme) indicated why low
ity of liver phosophorylase would be a nondiag-
c finding: defects in any of the enzymes in
ascade, as well as of phosphorylase itself,
result in low phosphorylase activity. Since
for phosphorylase activity on liver biopsy
mens involved active enzyme only, decreased lev-
f this form in the finding of low activity could
due to a deficiency of phosphorylase itself in
resence of a normal activating system, or to
ts in the activating system with the amount of
phosphorylase remaining normal. Thus, 2 sets
says are required. Results of such assays in
2 patients indicated low total phosphorylase
, liver phosphorylase deficiency), and not a
iency of the phosphorylase activating system of
iver. Attention is drawn to the fact that the
ng of low liver phosphorylase activity can
y be introduced as an artifact through examin-
of improperly prepared biopsy specimens or
psy tissue. It is suggested that the term gly-
osis Type VI be applied only to the condition
ose patients in whom the deficiency of liver
phosphorylase has been documented by low activity of both active and total liver phosphorylase.

7059 JAUNDICE ASSOCIATED WITH URINARY INFECTIONS IN PREGNANCY. *(Fr.)*

Monges, A.; Tronconi, J. C.; Legre, M.; Daoulas, H.; Serment, H.; Piana, L.; Ruf, H.; Blanc, R. (Hopital de la Conception, Marseille, France). *Med. Chir. Dig.* 2(6):345-350, 1973.

Of 15 pregnant women who developed jaundice in association with urinary infections, most were young and 7 were primigravidae. Symptoms developed during months 5 to 8 1/2 of pregnancy. Manifest symptoms of acute pyelitis were present in 12 cases. Blood bilirubin levels were about 50-60 mg/liter in most cases, and conjugated bilirubin predominated. Other symptoms included pruritis, anemia, asthenia, anorexia, weight loss, nausea, vomiting, abdominal distention, and chronic constipation. None of these patients developed toxemia of pregnancy, and all responded to treatment with antibiotics. Liver function tests were not very helpful in establishing the etiology of this jaundice: flocculation tests were negative in most cases, and while serum alkaline phosphatase, cholesterol, and lipid values were increased, the elevation was not significant. Although signs of hemolysis were found in some patients, the jaundice did not appear to be hemolytic in nature. Similar signs of hemolysis were also present in 6 of 9 pregnant women with urinary infections but no jaundice. A liver biopsy, obtained from 1 patient during cesarean section, revealed lesions similar to those described for bacterial jaundice: portal and periportal infiltrates, hepatocytic lesions, and signs of bile retention with intracanalicular thrombi. These findings and signs of cytolysis present in some patients suggest that the jaundice is due to bacterial hepatitis secondary to septicemia resulting from the urinary infection. Hormones secreted during pregnancy may aggravate cholestasis resulting from portal hepatitis and favor fixation of bacteria in the liver by slowing their hepatic transit. It is important to differentiate this form of jaundice from viral hepatitis, since prompt treatment helps reduce infant mortality. Of these 15 women, 9 had premature infants, 4 delivered at term, and 2 were lost to follow-up. Eleven infants were alive at birth and 2 were stillborn.

7060 HYPOPLASIA OF THE INTRAHEPATIC BILE DUCTS WITH A CLINICALLY BENIGN COURSE. *(Ger.)*

Luders, D. (Pediatr. Clin., Univ. Gottingen, Germany). *Monatsschr. Kinderheillkd.* 121(12):717-720, 1973.

Hypoplasia of the intrahepatic bile ducts was diagnosed in 6 boys who developed jaundice several days to 8 weeks after birth. One patient developed jaundice in the course of bronchitis and 3 others had urinary infections which responded to antibiotics.

Although intrahepatic cholestasis may favor the development of pyelonephritis, it is more likely that the association of these 2 diseases is fortuitous. One infant had Down's syndrome and another was born prematurely. Liver biopsies, taken during the first few months of life, demonstrated the absence of bile ducts, at least in some of the portal fields examined. Isolated giant cells and round cell infiltrates were detected in the portal fields in 2 of these 6 infants. The ^{125}I-bengal rose test confirmed that the bile ducts were not completely blocked: from 7.1 to 82.0% of the dye was excreted in the stool in 5 days. Bilirubin levels normalized 3-4 months after birth in 5 patients, but the remaining child still has a slightly elevated value at age 2.5 yr. These findings suggest that hypoplasia of the intrahepatic bile ducts is due to retarded development of the bile ducts, rather than to neonatal hepatitis with intrahepatic cholestasis or to malformations associated with atresia of the extrahepatic bile ducts (MacMahon-Thannhauser syndrome).

7061 INTRAHEPATIC BILIARY FIBROADENOMATOSIS.

(Fr.) Auvert, J.; Weisgerber, G. (H. Mandor Hosp., Paris, France). *Med. Chir. Dig.* 2(6):363-373, 1973.

To gain more information on the pathology and clinical course of intrahepatic biliary fibroadenomatosis, 22 patients (12 females and 10 males) were followed for 1-28 yr. All 22 children had splenomegaly and portal hypertension, and 20 presented at age 1-14 yr (mean 7 yr) with hematemesis. After shunt surgery, performed 19 times on 18 children, esophageal varices disappeared and there was no recurrence of bleeding in 15 cases. Splenorenal shunts became obstructed in 2 cases: 1 patient died of recurrent bleeding and the other recovered after a portacaval shunt was performed 6 months later. Of the 4 unoperated patients, 2 had no signs of bleeding, 1 developed hepatic coma after a severe hemorrhage and died, and 1 had severe kidney failure due to polycystic kidneys. Portal hypertension was responsible for 3 deaths. When they were first examined, 21 patients had hepatomegaly, but liver function tests were normal or almost normal. Collagenous fibrosis of the portal spaces was found in 20 surgical liver biopsies. This fibrosis extended perilobularly, joining Kiernan's spaces, but never reached inside the liver lobules which were normal in structure. Both small and ectatic bile ducts were involved. Autopsies performed on 5 children who died revealed that the extrahepatic biliary tract was hypertrophied, possibly as an adaptation to proliferation of intrahepatic bile ducts and increased bile flow. Severe cholangitis developed in 3 patients, and 2 of them died. Gross examination showed dilatation of the superinfected intrahepatic biliary tract: large cavities limited to the left lobe in one case and diffuse ectasias, and about 1 cm in diameter, in the other. Although both patients had undergone shunt surgery, 4 months and 9 yr before, resp., neither gross examination of the liver nor microscopic examination of liver biopsies showed a
evidence of this. None of these 22 patients died
hepatocellular failure; a 13-yr-old girl who died
with severe jaundice had intercurrent viral hepatit
Morphological kidney anomalies were found in 19 of
22 children although kidney function remained unch

7062 INTRAHEPATIC CHOLESTASIS IN CHRONIC VENO CONGESTION.

(Cz.) Chlumska, A. (Med.
Charles Univ., Prague, Czechoslovakia). *Cesk. Gast
enterol. Vyz.* 27(8):532-534, 1973.

Autopsies performed on 70 patients (36 men and 34
en, aged 46-87 yr) with histories of chronic cardi
insufficiency revealed that 17 (24%) had intrahepat
cholestasis. These included 11 of the 51 with coro
nary atherosclerosis, 4 of the 11 with rheumatic h
disease, and 2 of the 8 with chronic cor pulmonale.
Histological examination of the liver showed that
pigment was present in the form of thrombi in bile
capillaries near the central veins or, in a few ca
as intracytoplasmic granules in liver cells adjace
to the central veins. All of those examined had m
derately severe steatosis, but the extrahepatic bil
ary tract was intact in all subjects with cholestasis. Intrahepatic cholestasis was diagnosed in 7
53 patients with moderate hepatic venostasis, in 8
the 13 with congestion, and in 2 of the 4 with hep
tic fibrosis. Hemorrhagic infarcts were present i
the lungs of 8 of the 70 autopsied patients, and 6
these 8 patients had intrahepatic cholestasis. It
concluded that intrahepatic cholestasis in patient
with chronic cardiac insufficiency results from hy
oxic damage to the liver cells.

7063 SYNTHESIS AND EXCRETION OF BILE ACID SUL FATES: AN IMPORTANT PROTECTIVE MECHANIS IN CHOLESTASIS.

(Ger.) Stiehl, A. (Med. Clin.,
Univ. Heidelberg, Germany). *Verh. Dtsch. Ges. Inn
Med.* 79:948-950, 1973.

Sulfated and nonsulfated bile acids were determine
in urine and serum from 10 patients with extrahepa
tic biliary obstructions, 10 with hepatitis, 10
with cirrhosis, and 4 with cirrhosis and kidney
failure. No significant differences were found be
tween the mean urinary excretion of nonsulfated
bile acids in patients with extrahepatic biliary
obstructions (19.2 ± 18.9 mg/day), hepatitis (9.28
± 6.01 mg/day), and cirrhosis (12.29 ± 9.58 mg/day
but patients with cirrhosis and kidney failure excreted significantly more (75.01 ± 25.00 mg/day)
these bile acids than did the other 3 groups. Uri
nary excretion of sulfated bile acids averaged 25.
± 24.94 mg/day in extrahepatic biliary obstruction
12.70 ± 7.0 mg/day in hepatitis, 20.56 ± 26.74 mg/
day in cirrhosis, and 15.87 ± 16.75 mg/day in cirrhosis and kidney failure. Thus, in all patients
except those with cirrhosis and kidney failure, mo
than 50% of bile acids were excreted in the urine
their sulfate esters. The concentration of nonsul

ed bile acids in serum was about 10 times higher
that of sulfated bile acids in all 4 groups.
significant differences were found between the 4
ps of patients studied. In a patient with neo-
stic biliary obstruction and progressive chole-
sis, measurements made on 5 successive days
ed an increase in the relative percentage of
fated bile acids from 23.4% to 64.5%. On the
er hand, the relative percentage of sulfated bile
ds decreased from 46.2% to 14.3% over a 5-day
iod in a patient with regressing cholestasis which
been caused by cholangitis.

4 BENIGN VASCULAR TUMORS OF THE LIVER IN CHILDREN. *(Dut.)* Gerards, L. J.; van
rom, C. G.; Voute, P. A. (Wilhelmina Children's
., Utrecht, Netherlands). *Ned. Tijdschr. Gen-
d.* 117(44):1633-1637, 1973.

e reports are presented for 4 infants (3 girls
1 boy, aged 2-9.5 months) with vascular tumors
the liver. The first clinical symptom was ab-
inal swelling in all 4 cases. Hepatomegaly was
d in 3 patients and 1 had a tumor in the upper
omen, the origin of which could not be esta-
shed. Two patients had gastrointestinal symptoms,
d cardiac decompensation, and 3 had decreased
oglobin values; but only 1 had jaundice. This
ient, who did not have cardiac decompensation,
severe disturbances in liver function as a re-
of extrahepatic biliary obstruction and liver
damage. On auscultation of the abdomen above
liver, a murmur was detected in 2 cases. At
rotomy 2 of the patients had hemangioendotheli-
s and 2 had hemangiomas of the liver; in addition,
tient had an hemangioma of the skin. The diag-
is was confirmed by histological examination of
sies in 3 cases. Telecobalt therapy (500 rads
n in 10 sessions over a 14-day period) was used
essfully on 2 patients who are alive and well
yr and 10 months after treatment, resp. A large
e of radiation (1830 rad on the right and 1820 on
left in 36 sessions over 6 weeks) was adminis-
ed to another patient who received additional
iation for an hemangioma of the skin; this pa-
nt is alive and well 2 yr after treatment. The
aining patient, who had extrahepatic biliary ob-
uction, is alive and well at age 3 yr after ad-
istration of megavolt therapy (600 rad over the
er and 3100 rad over the probable tumor region in
-week period).

5 CURRENT APPROACH TO THE TREATMENT OF HEPATIC METASTASES OF CANCER. *(Fr.)* Gautier-
oit, C.; Luez, J.; Vermesse, G.; Duwat, G. (Munic. Hosp., Lens, France). *Lille Med.* 18(10):1271-1275, 1973.

Of 4 patients who underwent surgery for hepatic metastases, 2 died postoperatively of acute liver failure and after 2 operations necessitated by an acute duodenal ulcer and evisceration, resp. The 2 remaining patients survived for 98 days and 2 yr; in the latter case, surgery was supplemented by intra-arterial chemotherapy for a recurrence which developed 16 months after surgery. It is concluded that surgery should be reserved for solitary hepatic metastases located in the left lobe. One patient who underwent complete dearterialization of the liver died 36 hr after surgery in a coma and with diffuse bleeding consistent with acute liver failure. Of 6 patients who underwent truncal ligation of the hepatic artery, 2 died postoperatively of acute respiratory failure and cardiovascular complications, resp. Liver function returned to normal and hypochondrial pain disappeared, but hepatic scintigraphy showed no regression of the metastases in the remaining 4 patients. Two of these patients died after 7 and 8 months, resp., and 2 are still alive 9 and 10 months, resp., after surgery. Continuous perfusion of the hepatic artery for 3-6 weeks with a complex sequence of 5-fluorouracil, thio-TEPA, vinblastine, methotrexate, actinomycin or mitomycin, and ametycin was performed on 3 patients who died after 15-20 days of myocardial infarction (2 cases) and pulmonary embolism (1 patient), possibly due to use of mitomycin. Before they died, marked subjective improvement was noted in 2 cases and regression of hepatomegaly in 1. Combined intra-arterial chemotherapy and truncal ligation of the hepatic artery in 2 cases induced subjective improvement in both patients and produced regression of the lesions in 1. One patient died after 6 months and the second is alive 4 months after completion of treatment.

7066 LIVER DISEASE IN CHILDHOOD: PRINCIPLES OF MANAGEMENT. *(E.)* Williams, R. (King's Coll. Hosp., London, England). *Postgrad. Med. J.* 50(584):381-385, 1974.

7067 LOSS OF A SERUM PROTEIN FROM HEPATOMA-BEARING ANIMALS. *(E.)* Ove, P.; Coetzee, M. L.; Obenrader, M.; Short, J. (Univ. Pittsburgh Sch. Med., Pa.). *Oncology* 29(1):13-21, 1974.

7068 HEPATIC GRANULOMATA DUE TO "BENIGN" PLAGUE IMPORTED FROM VIETNAM: CASE REPORT. *(E.)* Schwade, J.; Sanford, J. P. (Dallas VA Hosp., Tex.). *Milit. Med.* 139(7):554-556, 1974.

7069 CHRONIC HEPATIC ENCEPHALOPATHY TREATED WITH ORAL LACTOSE IN A PATIENT WITH LACTOSE MALABSORPTION. *(E.)* Welsh, J. D.; Cassidy, D.; Prigatano, G. P.; Gunn, C. G. (Univ. Oklahoma Health Sci. Ctr., Oklahoma City). *N. Engl. J. Med.* 291(5):240-241, 1974.

7070 INTRAHEPATIC ARTERIAL PORTAL COMMUNICATIONS: ANGIOGRAPHIC STUDY. *(E.)* Itzchak, Y.; Adar, R.; Bogokowski, H.; Mozes, M.; Deutsch, V. (Chaim Sheba Med. Ctr., Tel-Hashomer, Israel). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(2):384-387, 1974.

7071 POST-NATAL INFARCTION OF THE RIGHT LOBE OF THE LIVER. *(E.)* Hartveit, F.; Maehle, B.; Borsting, S. (Gade Inst., Univ. Bergen, Norway). *Acta Paediatr. Scand.* 63(3):453-456, 1974.

7072 INTRAHEPATIC CHOLESTASIS IN HYPEREMESIS GRAVIDARUM: A CASE REPORT. *(E.)* Marks, P. A.; Kammeraad, L. A.; Papp, J. P. (Blodgett Mem. Hosp., Grand Rapids, Mich.). *Mich. Med.* 73(20):385-387, 1974.

7073 A CARCINOID SAGA. *(E.)* Battersby, C.; Egerton, W. S. (Dept. Surg., Univ. Queensland, Australia). *Aust. NZ J. Surg.* 41(1):32-38, 1974.

7074 ORGANIZATION OF CONTROLLED TRIALS IN PAEDIATRIC LIVER DISEASE. *(E.)* Gray, O. P. (Welsh Natl. Sch. Med., Heath Park, Cardiff). *Postgrad. Med. J.* 50(584):396-398, 1974.

7075 PYOGENIC LIVER ABSCESS. ANGIOGRAPHIC DIAGNOSIS AND TREATMENT BY CLOSED ASPIRATION. *(E.)* Novy, S. B.; Wallace, S.; Goldman, A. M.; Ben-Menachem, Y. (Univ. Texas System Cancer Ctr., Houston). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(2):388-395, 1974.

7076 LIPID AND LIPOPROTEIN ABNORMALITIES IN LIVER DISEASE: THE POSSIBLE ROLE OF LECITHIN: CHOLESTEROL ACYLTRANSFERASE DEFICIENCY. *(E.)* McIntyre, N.; Calandra, S.; Pearson, A. J. G. (Roy. Free Hosp., London, England). *Scand. J. Clin. Lab. Invest.* Suppl. 137:115-120, 1974.

7077 MEASUREMENT OF BILE ACID KINETICS BY ISOTOPE DILUTION IN MAN. *(E.)* Hofmann, A. F.; Hoffman, N. E. (Mayo Clin., Rochester, Minn.). *Gastroenterology* 67(2):314-323, 1974.

7078 PATHOLOGY WITH REFERENCE TO THE BILE RETENTION SYNDROME. *(E.)* Emery, J. L. (Sheffield Children's Hosp., England). *Postgrad. Med. J.* 50(584);344-347, 1974.

7079 INFLUENCE OF DRUGS ON BILIRUBIN DISPOSAL. *(E.)* Berthelot, P. (Henri Mondor Hosp., Creteil, France). *Isr. J. Med. Sci.* 10(4):363-368, 1974.

7080 MALIGNANT LIVER TUMORS IN CHILDREN. *(E.)* Ein, S. H.; Stephens, C. A. (Hosp. Sick Children, Toronto, Canada). *J. Pediatr. Surg.* 9(4):491-494, 1974.

7081 PRIMARY HEPATOMA AND INVASIVE LOBULAR CARCINOMA OF BREAST WITHOUT CIRRHOSIS. *(E.)* Sweet, C.; Sisson, J. A. (Boone County Community Hosp., Omaha, Neb.). *Nebraska Med. J.* 59(6):238-241, 1974.

7082 OBSTRUCTIVE JAUNDICE IN EARLY INFANCY. AETIOLOGICAL, CLINICAL AND PROGNOSTIC ASPECTS. *(E.)* Pretorius, P. J.; Roode, H. (H. F. Verwoerd Hosp., Pretoria, South Africa). *S. Afr. Med. J.* 48(19):811-815, 1974.

7083 POSTOPERATIVE JAUNDICE. AN APPROACH TO A DIAGNOSTIC DILEMMA. *(E.)* Morgenstern, L. (Cedars-Sinai Med. Ctr., Los Angeles, Calif.). *Am. J. Surg.* 128(2):255-261, 1974.

7084 AMEBIC HEPATIC ABSCESS. *(E.)* Lydon, S. B. Dodds, W. J. (Med. Coll. Wisconsin, Milwaukee). *Am. J. Gastroenterol.* 62(1):71-74, 1974.

7085 RESOLUTION OF AMOEBIC LIVER ABSCESS, STUDIED BY SERIAL LIVER SCANNING. *(E.)* Poulose, K. P.; Sahajanadan, V. K.; Mohankumar, V. K.; Padmanabhan, V.; Ramachandran, M. (Med. Coll., Trivandrum, Kerala, India). *J. Assoc. Physicians India* 22(3):237-241, 1974.

7086 THE IMMUNOLOGY OF LIVER DISORDERS. *(E.)* Walker, G. (St. Mary's Hosp., London, England). *Proc. R. Soc. Med.* 67(6):566-573, 1974.

7087 PROTEIN SYNTHESIS IN NEURONS AND GLIAL CELLS BY EXTRAHEPATIC CHOLESTASIS IN RATS. *(E.)* Lundborg, H.; Blomstrand, C. (Sahlgren Hosp., Goteborg, Sweden). *Exp. Neurol.* 44(2):274-281, 1974.

7088 SPONTANEOUS RUPTURE OF THE LIVER DURING PREGNANCY. *(Fr.)* Huguet, C.; Lemoine, J. P.; Hadchouel, P.; Bloch, P. (Hosp. St. Antoine, Paris, France). *Med. Chir. Dig.* 2(6):351-354, 1973.

7089 WILSON'S DISEASE LOCATED IN THE LIVER. (FAMILY STUDY). *(Sp.)* Guardia, J.; Bacardi, R.; Martinez-Vazquez, J. M.; Torruella, M.; Fiol, C.; Schwartz, S.; Buendia, E.; Rona, V.; Tornos, J. (Dept. Med., Univ. Autonoma, Barcelona, Spain). *Rev. Clin. Esp.* 129(5):5-15, 1973.

7090 HEPATIC TRAUMA. *(Rus.)* Telkov, N. A.; Telkov, E. N.; Kaliabarov, T. K. (Semipalatinsk Med. Inst., USSR). *Vestn. Khir.* 112(1):87-91, 1974.

COMPLICATIONS AND CAUSES OF DEATH AFTER SUR-
GERY FOR HEPATIC TRAUMA. *(Rus.)* Shapkin, V.
Grinenko, Zh. A. (Vladivostok Med. Inst., USSR).
a. Khir. 112(1):91-97, 1974.

JAUNDICE DURING PREGNANCY. *(Fr.)* Chevrel,
B. (St. Antoine Hosp., Paris, France). *Med.*
Dig. 2(6):337-344, 1973.

7093 IDIOPATHIC JAUNDICE DURING PREGNANCY. *(Cz.)* Teichmann, W. (Clin. Int. Med., Univ. Rostock, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 28(2):81-84, 1974.

See also, 6531, 6680, 6793, 6794, 6800, 6801, 6803, 6818, 6821, 6822, 6883, 6924, 7103, 7105, 7113, 7120, 7176, 7190, 7229, 7236, 7276, 7314, 7321, 7324.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

JAUNDICE, HYPERTROPHIC PYLORIC STENOSIS,
AND HEPATIC GLUCURONYL TRANSFERASE. *(E.)*
ley, M. M.; Felsher, B. F.; Asch, M. J.; Carpio,
Isaacs, H. (Childrens Hosp. Los Angeles, Calif.).
ediatr. Surg. 9(3):359-364, 1974.

s of hypertrophic pyloric stenosis and concomitant
dice are reviewed. Two causes of jaundice are
idered possible in these cases: first, the
ssive production of bilirubin, and secondly, de-
ive transport and conjugation of free bilirubin.
ach of 12 infants with hypertrophic pyloric sten-
, a serum bilirubin determination was performed
re pyloromyotomy. Of the 12 patients, 5 were
rly jaundiced and 7 were not. The jaundiced
ents had hepatic glucuronyl transferase activity
een 60-180 μg/conjugated/bilirubin/g of liver/hr,
ompared with 520-800 μg in patients without jaun-
. In both groups of patients, microscopic findings
ed increased hepatic glycogen content, hemato-
sis, and hemosiderosis. The only recognized
cidental clinical diseases were phenylketonuria
patient and microcephaly in another. It is
ent that the jaundiced infant with hypertrophic
ric stenosis and jaundice has less hepatic glucur-
transferase activity than the nonjaundiced pa-
t with hypertrophic pyloric stenosis. The reason
this decrease is not known although decreased ca-
c intake could be a factor.

NAVAJO JAUNDICE: A VARIANT OF NEONATAL
HYPERBILIRUBINEMIA ASSOCIATED WITH BREAST
ING. *(E.)* Saland, J.; McNamara, H.; Cohen, M.
Montefiore Hosp. Med. Ctr., Bronx, N.Y.). *J.*
atr. 85(2):271-275, 1974.

inical and chemical analysis of 47 Navajo neo-
s demonstrated a high incidence of unconjugated
rbilirubinemia during days 1-4 compared with
lack, Puerto Rican, and white control neonates.
vidence of isoimmunization was found in 40 of
Navajo infants, and the controls were also free
soimmunization problems. The mean daily serum
rubin concentration in the control group in-
sed from just above 3 mg/100 ml on day 1 to a
imum of 5.5 mg/100 ml on day 2. Within the
jo group, the 8 bottle-fed infants had an ini-
serum bilirubin concentration of 8.4 mg/100 ml
concentrations appeared to plateau at 9.4 mg/100
on day 2. In the 39 breast-fed infants, concentrations rose continuously from 7.5 mg/100 ml on day 1 to reach 14.5 mg/100 ml on day 4. No data were available after day 4 for the majority of babies. The mean breast-milk inhibition of bilirubin glucuronyl transferase activity in rat liver homogenates was 29.9% for Navajo breast milk *versus* 3.8% for control milk. The higher the bilirubin concentration in any individual baby, the greater the inhibitory activity of its mother's milk. Assays to determine the cause of neonatal jaundice in nonbreast-fed infants showed no inhibitor of bilirubin glucuronyl transferase in maternal, cord, or newborn infant sera. It is suggested that genetic and/or environmental factors are significant in the etiology of jaundice in Navajo neonates.

7096 EFFECT OF PHENOBARBITAL ON LIVER FUNCTIONS IN PATIENTS WITH DUBIN-JOHNSON SYNDROME. *(E.)* Shani, M.; Seligsohn, U.; Ben-Ezzer, J. (Chaim Sheba Med. Ctr., Tel Hashomer, Israel). *Gastroenterology* 67(2):303-308, 1974.

In 13 patients (10 men and 3 women, aged 20-62 yr) with Dubin-Johnson syndrome, treatment with phenobarbital (100 mg 3 times/day) for 2 weeks significantly decreased plasma levels of total and direct bilirubin. Values decreased from pretreatment means of 3.28 to 2.41 mg/100 ml and from 2.06 to 1.44 mg/100 ml, resp. The transport maximum of BSP increased significantly from a mean of 0.35 before treatment to 0.67 mg/min. However, these effects were variable, and some patients did not respond to phenobarbital. The usual Dubin-Johnson pattern of corpropor-phyrin excretion in the urine as well as the plasma levels of factor VII were virtually unaffected by this drug. The findings support the theory that phenobarbital not only induces enzymes involved in hepatic drug metabolism, but also enhances biliary excretion of various compounds.

7097 BETA-GLUCURONIDASE IN DUODENAL BILE OF JAUNDICED NEWBORN INFANTS TREATED WITH PHOTOTHERAPY. *(E.)* Lund, H. T.; Petersen, I. (Glostrup Hosp., Denmark). *J. Pediatr.* 85(2):268-270, 1974.

Duodenal bile was analyzed for β-glucuronidase concentration in 10 newborn infants (5 male and 5 female, aged 3-7 days) with hyperbilirubinemia (≥ 100 mg/liter) but without signs of isoimmunization. Five infants received phototherapy for 24 hr after the 1st bile sampling while 5 served as controls. The light unit was equipped with 8 blue 20 watt fluorescent bulbs, with irradiating energy at the infant level of 9 watt/m^2 (B)^5. Four additional 24-hr bile samples were analyzed after the experimental period. A significant decrease in mean β-glucuronidase activity was observed in the 2nd bile sample of both groups, but no significant difference was evident between treated (7.0 initially to 3.7 μmol/hr/liter) and untreated (7.8 to 4.7) infants. The bilirubin values increased at the 2nd reading in treated infants (from 109 to 120 mg/liter) and in controls (from 130 to 137), but in the next two 24-hr samples, decreased to final levels of 87 and 109, resp. This study demonstrated that phototherapy has no influence on the activity of β-glucuronidase in duodenal bile.

7098 PHOTOTHERAPY AND BARBITURATE TREATMENT FOR NEONATAL JAUNDICE. *(Ger.)* Obal-Nagy, M.; Thurzo, L.; Meszaros, J. (Med. Univ., Szeged, Hungary). *Acta Paediatr. Acad. Sci. Hung.* 14(3/4):201-207, 1973.

Serum bilirubin levels were determined daily on days 1-8 in 134 mature neonates whose bilirubin levels lay within the physiologically normal range. These newborns were divided into 5 groups: (1) 36 untreated controls, (2) 23 treated by whole-body irradiation with light (420-450 nm, intensity of 300 lux) alone for 8 days, (3) 25 treated with phenobarbital (5 mg/kg/day i.m. divided into 2 doses) alone for 8 days, (4) 30 given phototherapy on days 1-8 and phenobarbital on days 3-8, and (5) 20 given both phototherapy and phenobarbital on days 1-8. Serum bilirubin levels were decreased by both phototherapy and phenobarbital. While the effect of low-intensity illumination was not significant, administration of phenobarbital alone had a significant effect on bilirubin levels from day 5 on. In group (4) bilirubin levels were significantly decreased on day 8 and in group (5), on day 3. No side effects were observed with phototherapy or with the dose of phenobarbital employed. Treatment reduced the necessity for exchange transfusions by almost 80%.

See also, 6657, 7082.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

7099 SEVERE INTRAHEPATIC CHOLESTASIS DUE TO THIABENDAZOLE. *(E.)* Jalota, R.; Freston, J. W. (Univ. Utah Coll. Med., Salt Lake City). *Am. J. Trop. Med. Hyg.* 23(4):676-678, 1974.

A 32-yr-old woman developed severe and protracted intrahepatic cholestasis following a 4th dose of thiabendazole (25 mg/kg/day p.o.), given for prophylaxis against pinworm infestation. The cholestatic reaction was associated with nausea, intense pruritus, and a generalized rash. Despite prednisone treatment (4 mg/day), the jaundice persisted for more than 1 month without signs of remission. Laboratory findings indicative of cholestasis included alcoholic stools, urine bilirubin, and elevated serum conjugated bilirubin, alkaline phosphatase, cholesterol, and β-globulin fraction. A percutaneous transhepatic cholangiogram was followed by a massive intra-abdominal hemorrhage which led to death before the abdomen could be opened. Autopsy showed 2 needle puncture sites on the anterior-superior surface of the liver, 1 communicating with a hepatic vein. Liver photomicrographs revealed severe central cholestasis with bile pigment in hepatocytes, and numerous Kupffer cells and bile plugs. Portal areas showed increased numbers of mononuclear cells and eosinophils. The appearance was compatible with a drug-induced hypersensitivity type of cholestatis.

7100 HEPATOCELLULAR DYSFUNCTION WITHOUT JAUNDIC AFTER ENFLURANE ANESTHESIA. *(E.)* Denlinger, J. K.; Lecky, J. H.; Nahrwold, M. L. (Natl. Inst. Health, Bethseda, Md.). *Anesthesiology* 41(1): 86-87, 1974.

A 40-yr-old man with multiple endocrine adenomatosis (Sipple's syndrome) underwent 5-hr surgery for excision of a mass in the neck and radical neck dissection. Initial thiopental anesthesia (500 mg) was followed by enflurane maintenance (1.5-2.5% in nitrous oxide with 50% oxygen). Four hr postoperatively, body temperature increased, with spikes as high as 39 C (oral) over the next 10 days; this was accompanied by anorexia and general malaise. Liver function tests SGPT and SGOT rose to markedly abnormal levels while total bilirubin increased slowly to the upper limit of normal. The eosinophil count increased from 1% to 6% on the 3rd day and remained above normal for 2 weeks. Hepatitis B antigen was negative by radioimmunoassay, and hepatitis B antibody was not detected by passive hemagglutination. Fifteen days after surgery, antimitochondrial antibodies were not present; studies of lymphocyte transformation done at this time were negative. Liver biopsy was not performed. Upon discharge on the 21s day, the patient had recovered fully except for mild malaise and minimal elevation of SGOT and SGPT.

ght yr before this admission, the patient had bi-
teral adrenalectomy and total thyroidectomy with
lothane anesthesia for both. At that time, no cli-
cal evidence of hepatic injury was observed; both
OT and bilirubin levels were normal. Although
sidual halothane in the anesthetic apparatus may
ve precipitated the hepatic abnormalities in this
tient, the results suggest an allergic response to
flurane.

01 HEPATOTOXIC AGENTS IN SWEDISH INDUSTRY. HAZARDS AND PREVENTION. *(E.)* Yllner, S.
wedish Employer's Confederation, Stockholm). *Isr.*
Med. Sci. 10(4):456-458, 1974.

02 CHOLANGIOHEPATITIS AS ONE OF THE MOST COMMON FORMS OF CHRONIC BILIARY DISEASE
SOCIATED WITH CHRONIC LIVER DISEASE. *(Rus.)*
ibergrits, A. Ia. (Donetsk Med. Inst., USSR).
ach. Delo (5):86-90, 1974.

03 RELATIONSHIP BETWEEN METABOLISM OF FOREIGN COMPOUNDS AND LIVER INJURY. *(E.)*
tchell, J. R.; Jollow, D. J.; Gillette, J. R.
atl. Inst. Hlth., Bethesda, Md.). *Isr. J. Med.*
i. 10(4):339-345, 1974.

04 METHOTREXATE INDUCED LIVER DISEASE IN PSORIASIS. *(E.)* Millward-Sadler, G. H.;
van, T. J. (United Oxford Hosp., England). *Br. J.*
rmatol. 90(6):661-667, 1974.

105 LIMITED RELIABILITY OF THE MORPHOLOGICAL DIAGNOSIS OF DRUG-INDUCED LIVER DAMAGE.
.) Levij, I. S. (Hadassah Univ. Hosp., Jerusalem,
srael). *Isr. J. Med. Sci.* 10(4):398-403, 1974.

106 TREATMENT OF POISONING WITH Amanita phalloides ON THE BASIS OF PERSONAL
LINICAL EXPERIENCE. *(Cz.)* Dudova, V.; Blazej,
.; Veselsky, J.; Nieslanik, J.; Curik, R. (Dept.
ntern. Med., District Hlth. System, Ostrava,
zechoslovakia). *Cesk. Gastroenterol. Vyz.* 27(8):
43-545, 1973.

7107 USE OF DOSE-RESPONSE DATA FOR LIVER INJURY. *(E.)* Plaa, G. L. (Univ. Montreal Fac. Med., Canada). *Isr. J. Med. Sci.* 10(4):324-327, 1974.

7108 PHARMACOGENETIC FACTORS AS DETERMINANTS OF HEPATOTOXICITY. *(E.)* Vesell, E. S. (Milton S. Hershey Med. Ctr., Hershey, Pa.). *Isr. J. Med. Sci.* 10(4):334-338, 1974.

7109 GEOGRAPHIC FACTORS IN HEPATOTOXICITY. *(E.)* Davidson, C. S. (Boston City Hosp., Mass.). *Isr. J. Med. Sci.* 10(4):446-450, 1974.

7110 HEALTH HAZARDS IN OCCUPATIONAL EXPOSURE TO HEPATOTOXIC AGENTS. *(E.)* Wassermann, M.; Wassermann, D. (Hadassah Med. Sch., Jerusalem, Israel). *Isr. J. Med. Sci.* 10(4):451-456, 1974.

7111 DRUG-INDUCED HEPATIC DISEASE. *(E.)* Zimmerman, H. J. (VA Hosp., Washington, D.C.). *Isr. J. Med. Sci.* 10(4):386-397, 1974.

7112 PATHOLOGICAL CLASSIFICATION OF DRUG-INDUCED LIVER INJURY. *(E.)* Scheuer, P. J. (Roy. Free Hosp., London, England). *Isr. J. Med. Sci.* 10(4):377-379, 1974.

7113 SERUM ENZYME MEASUREMENT IN EXPERIMENTAL HEPATOTOXICITY. *(E.)* Zimmerman, H. J. (VA Hosp., Washington, D.C.). *Isr. J. Med. Sci.* 10(4):328-333, 1974.

7114 ACUTE NECRODEGENERATIVE HEPATITIS. *(E.)* Mokhobo, K. P. (Queen Elizabeth II Hosp., Maseru, Lesotho, South Africa). *S. Afr. Med. J.* 48 (19):833-835, 1974.

See also, 6672, 7017, 7059, 7104, 7187.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

115 HEPATITIS B ANTIGEN IN VIRAL HEPATITIS IN WEST LONDON. *(E.)* Farrow, L. J.; Lamb,
. G.; Coghill, N. F.; Lindon, R. L.; Preece, J.;
uckerman, A. J.; Stewart, J. S. (Watford Gen. Hosp.,
ngland). *Br. Med. J.* 3(5923):83-86, 1974.

n a 12-month study, 215 patients (129 men and 86
omen) with viral hepatitis were followed until clin-
cal and biochemical recovery and clearance of antigenemia. The median period of antigenemia was 7 weeks (mean 8.5 weeks). Parameters examined were serum bilirubin, alkaline phosphatase, and alanine amino transferase, as well as hepatitis B antigen (HBAg). The vast majority of patients exhibited febrile or gastrointestinal illness and dark urine followed by jaundice. Of the 215 patients, 32 (15%) were positive for HBAg. Since all 60 patients below 15 yr were negative, 21% of the subjects aged 15-

69 yr were antigen positive. Of 81 patients thought to have acquired their infection parenterally, 18 (22%) were HBAg positive. Four (17%) of 23 with a history of exposure to both ingestion and parenteral infection were positive, while only 10 (14%) of 70 with no known history of exposure to either mode of infection were positive. None of 41 patients with a definite exposure by ingestion was positive. In the parenteral group, the incidence of HBAg positive was greater in those with nontherapeutic than with therapeutic skin punctures, and 2 of 4 drug addicts as well as 2 of 4 tattooed patients were HBAg positive. The overall ratio of male (129) to female (86) patients was 1.5/1, but more than 5 times as many men (27) as women (5) were HBAg positive. Nearly half of these positive males were in the parenteral group though most of these exposures involved the use of disposable equipment during vaccinations, inoculations, and dental anesthetic. In the group without a known history of exposure, only males were positive. Male preponderance may be due to sex differences in susceptibility to infection. The 20-39 yr age groups accounted for 19 of the 27 positive men and all but 1 of the 5 positive women, demonstrating predominance in young adults. Sixty of 85 children (70%) were tested for HBAg as compared with 95% of adults (155 of 163), which could lead to underestimation of the proportion of children in this survey. Of the total patients with hepatitis, 35% were under 15 yr (86 patients), but only 28% of those tested for HBAg were children. Therefore the possibility cannot be excluded that HBAg might have been present in some of the children not tested.

7116 PLATELET AGGREGATION AND CRYO-IgM IN THE STUDY OF HEPATITIS AND IMMUNE COMPLEX STATES.

(E.) Penttinen, K.; Wager, O.; Rasanen, J. A.; Myllyla, G.; Haapenen, E. (Dept. Virol., Univ. Helsinki, Finland). *Clin. Exp. Immunol.* 15(3):409-416, 1973.

Hepatitis and other sera were studied for direct platelet aggregating activity in non-heated and heat-treated state, for inhibition of platelet aggregation by antiglobulin active cryoglobulin IgM components, and for sedimentation velocity of platelet aggregation activity by sucrose gradient centrifugation. Three distinct patterns of direct platelet aggregating activity were established: 1) 'aggregated IgG type': heating-dependent, greater than or equal to 19S, inhibitable by cryoglobulin IgM, serum anticomplementary; 2) 'antibody type': heating-dependent, 7S and/or 19S, non-inhibitable by cryoglobulin IgM, serum not anticomplementary; and 3) 'immunecomplex type': heating-independent, greater than or equal to 19S, inhibitable by cryoglobulin IgM, anticomplementary activity present or absent. In the heavy platelet aggregating-active sucrose gradient serum fractions of one patient with persistent cholangiolitic hepatitis, only IgG4 GM markers were detected.

7117 THE SYNDROME OF HEPATITIS AND APLASTIC ANAEMIA.

(E.) Ajlouni, K.; Doeblin, T. D. (Dept. Med., State Univ. N.Y., Buffalo). *Br. J. Haematol.* 27(2):345-355, 1974.

In the literature, 88 cases have been described of severe pancytopenia closely following the onset of apparently typical viral hepatitis. Two additional cases are reported. A 19-yr-old girl was hospitalized with jaundice and elevated serum bilirubin, SGOT, and SGPT. The serum was negative for hepatitis-associated antigen. After 15 days of treatment the patient was discharged but was readmitted 11 weeks later with recurrent jaundice and elevated bilirubin and SGOT values. Petechiae were observed 3 days later and the platelet count was 40,000/ml. Prednisone (30 mg/day) was prescribed but the patie had to be hospitalized a 3d time for hemorrhagic phenomena. The hemoglobin was 9.4g/dl, the packed cell volume 27%, WBC 1,000/ml, and no platelets were found. Bone marrow aspiration gave a hypocellular specimen with 90% lymphocytes. Treatment consisted of 100 mg of oxymetholone and 120 mg/day prednisone. Despite multiple blood and platelet transfusions the patient's condition deteriorated; she developed staphylococcal sepsis and died 3 week after admission. At autopsy, the liver showed early posthepatic fibrosis around the centrilobular veins and the periphery of the lobules; no evidence of active hepatitis was present. Similar findings are reported for a 15-yr-old boy who died of subarachnoid hemorrhage despite blood transfusions, prednisone, and oxymetholone; no autopsy was performed. The general features of this syndrome are the rapid and high mortality (88%) and an age and sex distribution parallel to that of hepatitis, unlike other series of aplastic anemia. Although viral damage to hematopoietic cells can be demonstrat *in vitro*, chromosomes in these patients were normal after short-term culture of peripheral lymphocytes. Therapeutically, androgens may be of some benefit despite the high mortality. No adequate explanatio for the association is available, but infectious hepatitis should be accepted as a potential cause of aplastic anemia.

7118 RESULTS FROM A STUDY OF CORTICOSTEROID EXCRETION IN INFECTIOUS HEPATITIS BY INTR VENOUS INJECTION OF 4-^{14}C HYDROCORTISONE.

(Rus.) Matveyev, A. (Vitebsk Med. Inst., USSR). *Ter. Arkh* 46(3):103-107, 1974.

4-^{14}C Hydrocortisone was infused i.v. for 30 min (1 μC, about 7 μg/100 ml of 5% glucose solution) in 9 patients with infectious and serum hepatitis and in 3 controls. The urine was collected for 2 days after infusion. One patient was given radioactive isotope twice: at the peak of the disease and before discharge from the hospital. After the first infusion 920,000 pulses/min were excreted during th first 24 hr; 91,000 pulses/min were excreted on the 2nd day and 124,000 pulses/min on the 3rd. After t 2nd infusion performed during convalescence, 1,546, pulses/min were excreted during the first 24 hr and 84,000 pulses/min on the 2nd day. To test the effe of prednisolone treatment, 3 patients received 2 in

ions of ^{14}C hydrocortisone each — before predniso-
e treatment and on the 2nd-4th day after treat-
t. The patient with the highest (82%) retention
the isotope showed a 4-fold increase of excretion
er treatment while excretion remained unchanged
the other 2 patients with pre-prednisolone retention
15% and 25% resp. Retention was highest during
first 24 hr after infusion. The low level of
ticosteroid excretion with urine can be explained
retention of some corticosteroids in the body and
the depression of the glucocorticoid function of
adrenal glands.

9 TRANSMISSION OF AUSTRALIA ANTIGEN BY INSECTS
[Periplaneta (Blatta) americana]: A POSSI-
ROUTE OF INFECTION FOR SERUM HEPATITIS. *(Ger.)*
e, H.; Sanwald, R.; Ritz, E. (Med. Clin., Univ.
delberg, Germany). *Verh. Dtsch. Ges. Inn. Med.*
1633-1635, 1972.

group of American cockroaches *(Periplaneta ameri-*
a) received injections of Australia antigen (AuAg)-
itive serum in the coelomic cavity while others
e infected p.o. by injection of AuAg-positive serum
o the gastrointestinal tract through a microtube.
trols were given injections of physiological saline
the coelomic cavity. The secretion ("vomitus")
ch cockroaches produce as a defensive reaction when
y are handled was collected on filter paper, as
aspirated hemolymph and saline from the controls.
filter paper was rinsed with physiological saline
ch was then concentrated and passed through a col-
charged with antibodies to AuAg. AuAg was studied
the hemolymph by electrophoresis and the complement-
ation test. High titers of AuAg were detected in
hemolymph and vomitus of cockroaches given injec-
ns of AuAg-positive serum in the coelomic cavity
the gastrointestinal tract. Since *P. americana*
taminates kitchen equipment and foods with its
retion, it may act as a vector in transmitting
rum hepatitis.

20 ACUTE FULMINANT HEPATOCELLULAR FAILURE IN
CHILDREN. *(E.)* Sundaravalli, N.; Sundar-
, V. M. A.; Nanthasubramanian, P.; Raju, V. B.
st. Child Hlth., Egmore, Madras, India). *Indian*
liatr. 11(1):33-36, 1974.

21 HEPATITIS-ASSOCIATED (AUSTRALIA) ANTIGEN IN
THE REPUBLIC OF IRELAND: A PRELIMINARY RE-
RT. *(E.)* Shattock, A. G. (Dept. Med. Microbiol.,
iv. Coll., Dublin, Ireland). *Ir. J. Med. Sci.* 143
):162-167, 1974.

22 THE FREQUENCY AND PERSISTENCE OF HEPATITIS-
ASSOCIATED ANTIGEN IN CALCUTTA BLOOD DONORS
D A CASE STUDY OF TRANSFUSION-ASSOCIATED HEPATITIS.
.) Graves, I. L.; Biswas, S. K. (Dept. Pathol.,
hns Hopkins Univ., Baltimore, Md.). *Indian J. Med.*
s. 62(3):384-393, 1974.

7123 AUSTRALIA ANTIGEN AMONG PATIENTS WITH JAUNDICE IN GHANA. *(E.)* Minami, K.; Yokota, T.; Herron, C. A. (Fukushima Med. Coll., Japan). *Fukushima J. Med. Sci.* 19(1/4):19-23, 1973.

7124 FATAL HERPES HEPATITIS ASSOCIATED WITH PEMPHIGUS VULGARIS AND STEROIDS IN AN ADULT. *(E.)* Orenstein, J. M.; Castadot, M. J.; Wilens, S. L. (Columbia Univ. Coll. Physicians Surg., New York, N.Y.). *Hum. Pathol.* 5(4):489-493, 1974.

7125 DNA OF HEPATITIS B VIRUS. *(E.)* Zuckerman, A. J.; Howard, C. R. (no affil.). *Nature (Lond.)* 250(5463):183-184, 1974.

7126 GIANT CELL HEPATITIS WITH CYTOMEGALOVIRUS INCLUSIONS IN AN ADULT. A CASE REPORT. *(E.)* Aikat, B. K.; Bhattacharya, T.; Datta, D. V. (Postgrad. Inst. Med. Educ. Res., Chandigarh, India). *J. Assoc. Physicians India* 22(1):63-66, 1974.

7127 EPIDEMIOLOGY AND PREVENTION OF VIRAL HEPATITIS. REVIEW. *(It.)* Dardanoni, L. (no affil.). *Ann. Sanita Pubblica* 34(1/2):13-14, 1973.

7128 ETIOLOGY AND PATHOGENISIS OF VIRAL HEPATITIS. AUSTRALIA ANTIGEN. *(It.)* Spano, C. (no affil.). *Ann. Sanita Pubblica* 34(1/2):15-18, 1973.

7129 EXAMINATION OF SERUM HEPATITIS (THE PREVENTIVE EFFECTS OF PREDONIN CHLORTRIMETON ON SERUM HEPATITIS AND THE HISTOLOGICAL IMAGE IN FOLLOW-UP EXAMINATIONS). *(Jap.)* Sakonji, M. (Nippon Univ. Med. Sch., Tokyo, Japan). *J. Nippon Med. Sch.* 40(3):185-197, 1973.

7130 SORBITOL EXCRETION IN PATIENTS WITH ACUTE HEPATITIS. *(Ger.)* Brachtel, D.; Popp, J.; Richter, E.; Zilly, W. (Med. Clin., Univ. Wurzberg, Germany). *Klin. Wochenschr.* 52(2):101-102, 1974.

7131 PSYCHIC CHANGES IN SURVIVORS OF HEPATIC COMA. *(Cz.)* Horecka, J.; Mandlova, I.; Misurec, J.; Slama, B.; Jezek, P. (Med. Fac., J.E.V. Purkinje Univ., Brno, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 27(8):514-520, 1973.

See also, 6833, 6834, 6949, 7177, 7248.

Chronic Hepatitis

7132 PSEUDO-TUMOR OF THE LIVER IN HEPATITIS.

(E.) Raouf, R.; Stebner, F. C. (Dept. Radiol., Wayne State Univ., Detroit, Mich.). *J. Am. Med. Wom. Assn.* 29(6):262-264, 1974.

A 68-yr-old woman with a 1-week history of fever, chills, and nausea was hospitalized. Chest x-ray findings were compatible with left lower lobe pneumonia and mild cardiac failure, and abdominal examination revealed moderate hepatomegaly; SGPT and alkaline phopshatase values were elevated. Although the patient responded to treatment with digitalis, diuretics, and penicillin, no change occurred in the size of the liver, and hepatomegaly appeared to be out of proportion to the degree of cardiac failure. A liver scan revealed moderate hepatomegaly with 2 discrete areas of decreased radioactivity, posteriorly in the right lobe and around the hepatic portal, which were thought to be neoplastic. However, upper gastrointestinal and barium enema examinations, cholecystogram, i.v. pyelogram, sigmoidoscopy, and a bone survey were all negative. A liver biopsy showed changes compatible with chronic hepatitis. Fibrosis and inflammatory cell infiltration were found, but no fatty infiltration was present, A 2nd liver scan, obtained 3 1/2 months after the first, revealed that the liver was much smaller and showed no filling defects. Instead, the area in the right lobe appeared to have increased activity, suggesting more severe cellular damage in the remainder of the liver. A 3rd scan, obtained 7 months after the first, showed that the liver was normal in size. Isotope activity was evenly distributed in the anteroposterior view, while mild patchy distribution was present in the bottom of the right lobe in the lateral view. This case demonstrates the value of serial scanning in differentiating between the pseudotumors of cirrhosis and chronic hepatitis and true space-occupying lesions of the liver, such as hepatoma, metastases, or cysts.

7133 DETECTION OF LYMPHOCYTES WITH INCREASED DNA-SYNTHESIS IN THE PERIPHERAL BLOOD OF PATIENTS WITH ACTIVE CHRONIC HEPATITIS. *(E.)*

Maerker-Alzer, G.; Schumacher, K.; Gross, R. (Med. Clin., Univ. Cologne, Germany). *Klin. Wochenschr.* 52(4):190-193, 1974.

Peripheral blood lymphocytes from 76 patients with active chronic hepatitis and 48 healthy donors were exposed to ^{14}C-thymidine (2 μC) for 2 hr. The basic metabolic rate of control lymphocytes corresponded to a ^{14}C-thymidine uptake which averaged 46 cpm. A similar uptake was observed in 52 patients, but in 24 cases the uptake of label averaged 290 cpm. Compared with patients with a normal basic metabolism of lymphocytes, the patients with elevated metabolism had significant increases in immunoglobulins G, A, and M, and a greater frequency of antibodies against nuclei, glomeruli, and small arteries of the kidney. The 2 groups of patients did not differ in occurrence of hepatitis associated antigen (HAA) or anti-HAA. Fourteen patients with elevated lymphocyte metabolism were available for follow-up. In 10 the elevation persisted and all died within 15 weeks due to the rapid progress of hepatitis. In the 4 survivors, there was a gradual return of lymphocyte metabolism rate to normal. It is suggested that *in vivo* activated lymphocytes are mediators of specific immunity, analogous to the graft rejection reaction. The rapid progress of disease in the patients with persistent elevated lymphocyte metabolism supports this hypothesis.

7134 ANTI-GLOMERULAR ANTIBODY IN CHRONIC ACTIVE AND CHRONIC PERSISTENT HEPATITIS. *(E.)*

Levy, R. L.; Hong, R. (Ctr. Hlth. Sci., Univ. Wisconsin, Madison). *J. Pediatr.* 85(2):155-158, 1974.

Indirect immunofluorescent techniques were used to test for smooth-muscle antibodies, anti-glomerular a tibodies, and compliment fixation on sera from 12 patients with chronic active hepatitis (8 females and males) and 7 with chronic persistent hepatitis (5 females and 2 males). The diagnosis was established b examination of percutaneous liver biopsies in all but 4 patients with chronic active hepatitis and severe clotting disorders, but all 4 had typical clinical and laboratory evidence of the disease with histories dating back longer than 2 yr. Ages at the time of diagnosis ranged from 5 to 15 yr. In all but 2 cases serum samples were obtained within 3 months of the onset of symptoms and after the diseas had persisted for an average of 25 months. Sera fro all 12 patients with chronic active hepatitis contained both anti-glomerular and smooth-muscle antibodies, while 5 of the 7 patients with chronic persistent hepatitis had smooth-muscle antibodies but none had anti-glomerular antibodies. In all patient both types of antibodies were of the IgG class. Non of the antibodies was complement fixing. There was no difference in results obtained from early samples and those obtained later. Only 1 patient had evidence of renal disease; he had interstitial nephriti which began at about the same time as the chronic active hepatitis. Anti-glomerular antibody in sera from patients with chronic active hepatitis was completely absorbed on a suspension of renal glomeruli, while smooth-muscle antibodies were not, suggesting that 2 separate antibodies are present. Thus, there appears to be an additional antibody response in patients with chronic active hepatitis. It is suggest that the test for anti-glomerular antibody may be a useful serological method to differentiate between these 2 forms of chronic hepatitis.

135 CELLULAR IMMUNE REACTIONS TOWARD HOMOLOGOUS
LIVER-SPECIFIC ANTIGENS (HLP) IN CHRONIC
EPATITIS. *(Ger.)* von Meyer zum Buschenfelde, K. H.;
nolle, J.; Berger, J. (Med. Clin., Univ. Mainz, Ger-
any). *Klin. Wochenschr.* 52(5):246-248, 1974.

ellular immunity to homologous, liver-specific pro-
eins was assayed in 100 patients with chronic in-
lammatory liver disease by using a two-phase leuko-
yte migration test. This technique employs a mix-
ure of liver-specific antigens consisting of a hepa-
ocellular membrane antigen (30-40%), a soluble cyto-
lasmic liver antigen (about 30%), and 3-4 plasma pro-
eins synthesized in the liver (<1-8% each). Patients
onsisted of 15 who had viral hepatitis more than 6
onths previously; 9 with chronic persistent hepati-
is; 34 with chronic active hepatitis (untreated); 23
ith histories of chronic active hepatitis dating back
ore than 1 yr who were receiving azathioprin (1.5 mg/
g/day) and prednisone (5-10 mg/day); and 19 with ac-
ive, progressive cryptogenic cirrhosis. Leukocyte
igration was significantly inhibited in 29 of the 34
atients with untreated chronic active hepatitis and
n 8 of 19 patients with cirrhosis, but in only 4 of
3 patients receiving immunosuppressives for chronic
ctive hepatitis, 2 of 15 posthepatitic patients, and
of 9 with chronic persistent hepatitis. Since leu-
ocyte migration was inhibited primarily in patients
ith hypergammaglobulinemia, cell-mediated immune re-
ctions toward liver-specific antigens would appear to
lay an important role in the pathogenesis of chronic
ctive hepatitis. Further research is necessary to
stablish whether this technique is suitable for dis-
inguishing between early stages of chronic progres-
ive liver inflammation and acute hepatitis.

136 THE THERAPEUTIC EFFECTIVENESS OF VITAMIN
A IN LIGHT-DARK ADAPTATION AND DISORDERS
N COLOR VISION IN CHRONIC LIVER DISEASE. *(Ger.)*
lein, S.; Dokert, B.; Marre, E.; Renger, F.; West-
rmann, K. (Carl Gustav Carus Med. Acad., Dresden,
ermany). *Z. Gesamte Inn. Med.* 29(12):484-487, 1974.

phthalmologic tests were performed on 25 patients
ith chronic persistent hepatitis, 25 with chronic
ggressive hepatitis, and 25 with cirrhosis to deter-
ine whether there was any correlation between the
everity of the liver disease, on one hand, and vita-
in A levels, the extent of dark adaptation, and ab-
ormalities in color vision, on the other. All of
hese patients were less than 65 yr old and had nor-
al ocular findings. Controls consisted of 25 sub-
jects with no evidence of liver disease. Curves for
ean values of immediate and 30-min dark adaptation
nd of anomalies in color vision were correlated with
he severity of the liver disease and were signifi-
antly lower than mean values obtained on controls.
ecause of their poor pupillary response to changes
n light intensity, 34 of these 75 patients with
hronic liver disease could not drive a car. Errors
n color vision occurred over the entire color spec-
rum. Total vitamin A, vitamin A ester, and vitamin
alcohol (retinol) levels were determined on sera
rom 13 patients with cirrhosis and 10 controls before
nd after p.o. administration of 300,000 IU of vita-
in A. Before administration of the vitamin, the levels of all vitamin A fractions were significantly higher in controls than in cirrhotics. Peak levels, reached 4.5 hr after administration of a single dose of vitamin A, were significantly lower in patients with severe cirrhosis than in controls. While retinol accounted for almost all of the vitamin A present initially, both retinol and the ester fraction contributed equally to peak levels. No matter whether a single 300,000 IU dose of vitamin A was given or 30,000 IU/day, divided into 2 doses/day, was administered for 3 weeks, no improvement was observed in dark adaptation, pupillary response, or color vision. Curves plotted from mean values for immediate adaptation to darkness appeared to be higher among patients with chronic liver disease only on the 2nd day after administration of a single 300,000 IU dose of vitamin A. Thus, it could not be demonstrated that vitamin A had any therapeutic effect on dark adaptation or color vision in patients with chronic liver disease.

7137 AUTOIMMUNITY AND IMMUNOSUPPRESSIVE THERAPY IN ACTIVE CHRONIC HEPATITIS. *(E.)* Eddleston, A. L. W. F.; Murray-Lyon, L. M.; Williams, R. (King's Coll. Hosp., London, England). *Med. Chir. Dig.* 2(6):319-321, 1973.

7138 CHRONIC AGGRESSIVE HEPATITIS. REPORT OF A CASE WITH VIRUS LIKE PARTICLES IN THE LIVER. *(E.)* Perez, V.; Maruffo, C. A.; Findor, J.; Bruch Igartua, E.; Van Nynatten, B. (Jose de San Martin Hosp., Buenos Aires, Argentina). *Acta Gastroenterol. Latinoam.* 5(4):179-182, 1973.

7139 GEOGRAPHICAL DIFFERENCES IN THE ETIOLOGY OF CHRONIC LIVER DISEASES: INCIDENCE OF AUSTRALIA ANTIGEN IN A STUDY MADE IN SOUTHERN ITALY. *(Fr.)* del Vecchio-Blanco, C.; Caporaso, N.; Coltorti, M. (1st Fac. Med. Surg., Univ. Naples, Italy). *Ann. Gastroenterol. Hepatol.* 9(5):423-433, 1973.

7140 CLINICAL EVALUATION OF NEW IMMUNOLOGICAL TESTS IN PATIENTS WITH CHRONIC HEPATITIS AND CIRRHOSIS. *(Rus.)* Kurdybailo, F. V.; Kovalenko, G. T.; Krivulia, A. V. (Leningrad Med. Inst. Sanit. Hyg., USSR). *Vrach. Delo* (5):76-79, 1974.

7141 EPINEPHRINE-INDUCED GLYCOGENOLYSIS AND LIPOLYSIS IN CHRONIC LIVER DISEASE. I. ABNORMALITIES IN SUGAR METABOLISM. *(Cz.)* Holik, K.; Rysanek, K.; Malinovska, V.; Parak, S. (Med. Fac., J. E. Purkyne Univ., Brno, Czechoslovakia). *Vnitr. Lek.* 19(9):852-859, 1973.

7142 EPINEPHRINE-INDUCED GLYCOGENOLYSIS AND LIPOLYSIS IN CHRONIC LIVER DISEASE. II. NONESTERIFIED FATTY ACIDS AND THEIR RELATION TO DECREASED GLUCOSE UTILIZATION. *(Cz.)* Holik, K.; Rysanek, K.; Malinovska, V.; Parak, S. (Med. Fac., J. E. Purkyne Univ., Brno, Czechoslovakia). *Vnitr. Lek.* 19(10):992-997, 1973.

7143 RHEOGRAPHIC EXAMINATION OF HEPATIC HEMODYNAMICS. II. THE RHEOHEPATOGRAPHIC PATTERN OF CHRONIC LIVER DISEASE. *(Cz.)* Obermajer, J.; Kucera, J.; Nevrtal, M. (Dept. Gastroenterol., Munic. Health System, Brno, Czechoslovakia). *Vnitr. Lek.* 19(9):891-899, 1973.

7144 CHRONIC CHOLESTATIC HEPATITIS. *(Rus.)* Podymova, S. D. (I. M. Sechenov 1st Moscow Med. Inst., USSR). *Sov. Med.* (8):99-105, 1973.

7145 CHRONIC AGGRESSIVE HEPATITIS: IS IT OFTEN AN UNDIAGNOSED DISEASE? *(Ger.)* Hilt, G. (Bayerwald Sanitorium, Windischbergerdorf, Germany). *Dtsch. Med. Wochenschr.* 99(24):1313-1315, 1974.

7146 STUDY OF CLINICAL, FUNCTIONAL, AND MORPHOLOGICAL CORRELATIONS IN THE DIAGNOSIS OF CHRONIC HEPATITIS. *(Rum.)* Oancea, R.; Negrea, F.; Carnaru, S.; Rosca, T.; Tutunaru, M.; Plesca, I. (Fundeni Hosp., Rumania). *Med. Interna (Bucur.)* 25(11):1363-1373, 1973.

7147 CHRONIC HEPATITIS: RELATION OF AUSTRALIA ANTIGEN AND ANTITISSUE ANTIBODIES TO THE HISTOLOGICAL FEATURES AND COURSE: BASED ON 75 CASES. *(Fr.)* Thomas, M.; Gateau, P.; Nusinovici, V.; Caroli, J. (St. Antoine Hosp., Paris, France). *Med. Chir. Dig.* 2(6):323-331, 1973.

7148 WAYS OF INTERPRETING THE PRESENCE OF AUSTRALIA ANTIGEN (AuAg) IN PATIENTS WITH CHRONIC HEPATITIS AND CIRRHOSIS. *(Rum.)* Turcu, E.; Efanov, A.; Macarie, C. (Colentina Hosp., Bucharest, Rumania). *Med. Interna (Bucur.)* 25(9):1127-1134, 1973.

7149 GLUCOCORTICOID THERAPY IN CHRONIC HEPATITIS. I. PRINCIPLES. *(Ger.)* Schimmelpfennig, W.; Wagner, K.; Schneider, G.; Kohly, A.; von Sass, S. (Charite Hosp., Humboldt Univ., Berlin, Germany). *Dtsch. Gesundheitsw.* 29(2):66-70, 1974.

See also, 6533, 6833, 6834, 6967, 7169, 7177.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

7150 UREA-CYCLE ENZYMES IN ALCOHOLIC HEPATITIS. *(E.)* Maier, K. P.; Volk, B.; Hoppe-Seyler, G.; Gerok, W. (Dept. Intern. Med., Univ. Freiburg, Germany). *Eur. J. Clin. Invest.* 4(3):193-195, 1974.

Activities of enzymes in the Krebs-Henseleit cycle in alcoholic hepatitis were measured in liver biopsy samples to determine possible parameters of hepatocyte necrosis. Liver specimens from patients 3-4 months after acute hepatitis and from healthy subjects (both groups on a 100 g protein/day diet) were examined for DNA and protein content, and for enzyme activities of carbamyl phosphate synthetase, arginase, argininosuccinate lyase, ornithine-keto acid-transaminase, and ornithine-carbamyl phosphate transaminase. In alcoholic hepatitis, the protein content was significantly decreased while DNA content was slightly increased compared to normal liver values. Activities of carbamyl phosphate synthetase and of arginase were significantly decreased in diseased livers, but activity levels of the other 3 enzymes remained unchanged in both groups. Although alcoholic hepatitis and alcoholic liver cirrhosis cannot be differentiated enzymatically by the measurement of urea-cycle enzymes in liver tissue, the decrease in arginase and carbamyl phosphate synthetase can be demonstrated in the human liver prior to the histological signs of liver cirrhosis. Therefore, even though not typical for alcoholic origin only, arginase activity does represent a sensitive parameter of liver disease. The findings here show that controlled protein intake and standardized methods of enzyme extraction are prerequisites to accurate evaluation of enzyme activity in alcoholic hepatitis.

7151 LIVER CIRRHOSIS, ALCOHOLISM AND ALCOHOL CONSUMPTION. *(E.)* Whitlock, F. A. (Roy. Brisbane Hosp., Australia). *Q. J. Stud. Alc.* 35(2):586-605, 1974.

7152 ZIEVE'S SYNDROME. *(E.)* Sylvest, J.; Juhl, E.; Ranek, L. (Frederiksberg Hosp., Copenhagen, Denmark). *Dan. Med. Bull.* 21(2):77-80, 1974.

See also, 6803, 7157.

Cirrhosis

53 LIVER IN SICKLE DISEASE - A HISTOPATHOLOGICAL STUDY. *(E.)* Chaubey, B. S.; anchandani, G. B.; Grover, S. (Gov. Med. Coll. sp., Nagpur, India). *J. Assoc. Physicians India* (3):243-249, 1974.

ochemical and histological examinations were per- rmed on 27 patients (aged 2-31 yr) with homozygous ckle cell disease (SS) and 25 (aged 2-50 yr) with terozygous sickle cell disease (SA). Patients re from the central part of the Indian subconti- nt and all but 2 belonged to low socioeconomic oups. Measurements of serum protein, bilirubin, kaline phosphatase, SGPT, and SGOT showed minimal moderate liver dysfunction; anemia was mild. ver biopsies demonstrated dilation of sinusoids in (81.5%) of the SS group and in 8 (32%) of the SA oup. Kupffer cell hyperplasia was present in 17 2.9%) of the SS patients and 10 (40%) of the SA tients. There were 24 cases (88.8%) of parenchy- l damage in the SS group and 16 (64%) in the SA oup. Necrosis observed in 11 SS patients (40.7%) s paracentral and focal, with 3 cases showing anges suggestive of cirrhosis. Of the 4 cases 6%) of necrosis in the SA group, 2 showed minimal crosis and the other 2 had paracentral and focal crosis with cirrhosis. In the 5 biopsies sugges- ve of cirrhosis (2 in the SA group and 3 in the SS oup, 1 of which was associated with hepatoma), fi- osis was marked in the portal tracts but minimal ound sinusoidal elements and groups of degenerating d necrosed cells. The histology was consistent th multilobular cirrhosis. Since patients with history of viral hepatitis, chronic alcoholism, and gestion of hepatotoxic drugs were excluded from is study, the observed hepatic changes are due to ckle cell disease. The results suggest a progres- on to cirrhosis, with a transition from a monolo- ılar to a multilobular variety.

54 ABO BLOOD GROUPS, RHESUS NEGATIVITY, AND PRIMARY BILIARY CIRRHOSIS. *(E.)* Hamlyn, N.; Morris, J. S.; Sherlock, S. (Roy. Free Hosp., ndon, England). *Gut* 15(6):480-481, 1974.

ie distribution of blood groups and Rhesus negativ- ty in 91 British patients with primary biliary cir- iosis was compared with a sample of registered blood onors from various parts of the U.K. The incidence A, O, and B + AB groups in the 91 patients was ie same as in the controls. Similarly, regional ialysis for A and O in 4 areas of England showed ie same distribution in 96 patients with primary iliary cirrhosis as in the general populations of ie regions. Assuming a national frequency of 18%, ie incidence of Rhesus negativity (19) in the 91 atients with primary biliary cirrhosis was the same s in the general population. The results do not confirm previous reports of an excess of A group in primary biliary cirrhosis. If the disease has a genetic basis, blood group is invalid as a marker for susceptibility.

7155 FAMILIAL HEPATIC CIRRHOSIS IN INFANTS ASSOCIATED WITH ALPHA$_1$-ANTITRYPSIN SZ PHENOTYPE. *(E.)* Wilkinson, E. J.; Raab, K.; Browning, C. A.; Hosty, T. A. (Med. Coll. Wisconsin, Milwaukee). *J. Pediatr.* 85(2):159-164, 1974.

The fatal expression of α_1-antitrypsin deficiency is reported in 2 sibling neonates (a boy and a girl) with congenital hepatic cirrhosis and minimal respiratory distress syndrome. The boy died at age 75 hr and the girl at age 13 days. Both infants had a similar clinical pattern: intrauterine growth retardation, massive edema, oliguria, ascites, spider angiomas, icterus, and gastrointestinal bleeding. In each case, autopsy revealed a moderately dark green liver with numerous nodules and patent extrahepatic ducts. Extensive fibrosis, with moderate numbers of regenerative nodules, was evident. The degenerating hepatocytes were filled with tan acidophilic diastase-resistant bodies. The gallbladder was somewhat distended in each infant and contained mucoid bile. Lungs were poorly aerated and minimal hyaline formation and patchy atelectasis were seen in microscopic sections. Esophageal varices were present in the lowest 1/3 of the esophagus. Pi typing showed that the α_1-antitrypsin phenotype of the boy was SZ, a partial α_1-antitrypsin deficiency. Although Pi typing of the girl was not performed, the data suggest that she had a similar or identical deficiency. This is further indicated by the α_1-antitrypsin phenotype of the parents (mother FS and father MZ), as well as by the characteristic liver lesions. A marked decrease in α_1-antitrypsin concentration (42 mg/100 ml) in the cord serum of the boy, compared with normal levels (203 mg/100 ml), implies that α_1-antitrypsin does not cross the placental barrier. *In utero* diagnosis of the deficiency may be possible by study of the amniotic fluid.

7156 CIRRHOSIS AND DEATH AFTER JEJUNOILEAL SHUNT FOR OBESITY. *(E.)* Mangla, J. C.; Hoy, W.; Kim, Y.; Chopek, M. (Monroe Community Hosp., Rochester, N.Y.). *Am. J. Dig. Dis.* 19(8): 759-765, 1974.

A 41-yr-old woman who was just under 5 feet tall and weighed 260 pounds underwent a jejunoileal bypass in which 17 cm of jejunum were anastomosed (end-to-side) to the terminal 6 cm of ileum, and the bypassed 397 cm of small intestine were left as a blind loop. Although the patient had a history of heavy drinking, preoperative liver functions were all normal, with the exception of a slight increase in alkaline phosphatase, and the liver appeared normal on gross examination at surgery. The patient was later readmitted twice, 4 and 7 months after surgery, for diarrhea which responded to diet therapy. Liver function tests became progressively more abnormal and a liver biopsy, performed during the 3rd hospitalization, showed severe fatty metamorphosis but no evidence of hepatocellular necrosis or regenerative nodule formation. Since liver function tests improved and the patient gained weight with diet therapy, plans to reestablish bowel continuity were cancelled. On her final hospital admission, 11 months after surgery, the patient presented with weakness, gross muscle wasting, gross ascites, peripheral edema, and hepatomegaly. Liver function tests showed still further degeneration, but tests for hepatitis-associated antigen were repeatedly negative. Diarrhea (up to 4 liters/day) and hepatic coma followed tube and i.v. feedings, but the patient was a poor risk for reestablishing bowel continuity. Succeeding episodes of hepatic coma continued until the patient died from hepatic failure and the effects of starvation 25 months after the bypass operation. Autopsy showed cerebral atrophy, jaundice with ascites (2500 ml), splenomegaly, esophageal varices, a healing gastric ulcer, and generalized moniliasis. Patent cirrhotic changes were found at autopsy although the patient was definitely not taking alcohol during the last 3 months of life. Although the cause of liver changes after ileal bypass is unknown, it is suggested that hepatic toxicity of absorbed secondary bile salts, the absence of a vital lipotrophic factor due to malnutrition, or the blind loop syndrome may be involved.

7157 SEX, ASCITES AND ALCOHOLISM IN SURVIVAL OF PATIENTS WITH CIRRHOSIS: EFFECT OF PREDNISONE.

(E.) Tygstrup, N.; Juhl, E.; Winkel, P. (Rigshosp., Copenhagen, Denmark). *N. Engl. J. Med.* 291(6):271-273, 1974.

Follow-up studies were conducted on 512 patients with cirrhosis (240 women and 272 men, mean age 59.45 yr) seen over a 7-yr period. Of these patients, 260 were treated with prednisone (15-20 mg/day initially, followed by 10 mg/day) and 252 received placebos. Survival data for prednisone-treated patients and controls were analyzed according to the criteria of sex, ascites, and alcoholism. Survival of the steroid-treated patients was significantly greater than that of controls. Female sex was the most positive single factor determining the effect of prednisone on survival, and ascites was the most negative factor. A significant alcohol consumption (50 g or more/day for more than 5 yr) tended to be a negative factor, but was too closely linked with male sex to be analyzed separately. In female patients with compensated, nonalcoholic cirrhosis, prednisone treatment increased the 6-yr survival by 1/2 to 2/3. Prednisone appeared to be ineffective in the treatment of compensated, nonalcoholic male patients. The results also indicate a possibly harmful effect of prednisone in patients with decompensated or alcoholic cirrhosis. However, the dosage and duration of therapy in the present study may not give the optimum balance between therapeutic and side effects.

7158 PSEUDO-ACUTE ABDOMEN IN CIRRHOSIS.

(Ger. Pedreira, J. D.; Villalonga, C.; Martinez-Vasquez, J. M.; Guardia, J.; Tornos, J.; Bacardi, R. (Munic. Hosp. Soc. Welfare, Free Univ., Barcelona, Spain). *Munchen. Med. Wochenschr.* 116(25):1253-1256 1974.

Case reports are presented for 8 patients (7 men and 1 woman, aged 41-60 yr) with cirrhosis who developed acute abdomen as a result of infectious peritonitis. These patients consisted of 3 with nodular cirrhosis 2 with alcoholic cirrhosis, and 3 with biliary cirrhosis. In most cases, the history of cirrhosis date back 1 yr or less, and peritonitis was the first complication in 6 of these 8 patients. None of the patients had undergone paracentesis before. In all cases, ascites fluid was cloudy, but many cultures of blood and ascites fluid were negative, probably because the patients had received antibiotics before they were hospitalized. *Escherichia coli* was isolated from ascites fluid in 4 cases, pneumococci in 2, and streptococci in 1. Five patients died 2 hr to 14 days after hospitalization. The cause of death was septic shock in 4 cases and hepatic encephalopathy in 1. Three patients responded to systemic an local antibiotics and paracentesis.

7159 PRIMARY BILIARY CIRRHOSIS AND SCLERODERMA.

(Fr.) Geffroy, Y.; Colin, R.; Hemet, J.; Galmiche, J. P.; Guillard, J.; Hecketsweiler, P. (Charles Nicolle Hosp., Rouen, France). *Med. Chir. Dig.* 2(5):281-286, 1973.

A 71-yr-old woman, hospitalized with jaundice, had a long history of arthralgias involving the hands, feet, and vertebrae; typical Raynaud's syndrome; telangiectasia; and sclerodactylia confirmed by a skin biopsy. The patient had suffered from asthenia and recurrences of jaundice which were not accompanied by abdominal pain, fever, or pruritis since an episode of jaundice 8.5 yr before. This episode of jaundice was compatible with viral hepatitis and regressed spontaneously after 1 month. Cholestasis and conjugated hyperbilirubinemia had been diagnosed during another recurrence 7 months prior to hospitalization. Although the jaundice regressed, the patient lost 10 kg, cholestasis persisted, and serum alkaline phosphatase values increased to 700 IU. After hospitalization a diagnosis of primary biliary cirrhosis was established on the basis of chronic intrahepatic cholestasis and the presence of high titers of antimitochondrial antibodies. However, n cirrhosis was detected at laparoscopy or in a punch liver biopsy. Other immunological abnormalities included positive rheumatoid rosettes and increased immunoglobulin levels, particularly the IgM fractio An incomplete autopsy, performed after the patient died of a stroke and before treatment with corticosteroids or immunosuppressants had been begun, confirmed the diagnosis of primary biliary cirrhosis. Periportal inflammatory cirrhosis was associated with lesions of the biliary canaliculi, some of whic were completely atrophied. Islets of epithelioid cells surrounding the canaliculi might represent a local immune reaction of the cellular type toward terial derived from the canaliculi as a result of gression which could be of viral, toxic, or un-own origin. Only 11 other cases of primary biliary rrhosis associated with scleroderma have been re-rted in the literature.

50 STUDIES OF SERUM AND URINARY BILE ACIDS IN PATIENTS WITH DECOMPENSATED CIRRHOSIS. *er.)* Wildgrube, H. J.; Dittmann, K.; Erb, W. (Ctr. tern. Med., Univ. Frankfurt/Main, Germany). *Verh. sch. Ges. Inn. Med.* 79:953-954, 1973.

ter separation into free, conjugated, and sulfated actions on Sephadex columns, bile acids in blood d serum from 30 patients with decompensated cirrho-s were analyzed by gas chromatography. The re-lts showed great variations in serum and urinary le acid concentrations and confirmed that there s a correlation between the cholanic acid concen-ations and the extent of cholestasis. Serum bili-oin and bile acid concentrations were only slight- above the upper normal range in a patient with stnecrotic cirrhosis and abnormal liver function sts (increased transaminase activities, normal kaline phosphatase activity, and decreased cholin-terase and albumin levels), while serum bile acids re significantly increased in another patient with oical signs of cholestasis. In cirrhotics with evidence of cholestasis, small quantities of bile ids were excreted in the urine and sulfate esters re present only in trace quantities in the blood d urine. When cirrhosis was accompanied by choles-sis, bile acids increased significantly. Sulfate ters of bile acids accounted for 10-20% of the in-ease in the serum and for 25-50% of the increase urine. In jaundiced patients cholic acid was the jor constituent of the nonsulfated fraction and enodeoxycholic acid the major constituent of the lfated fraction, suggesting that the damaged liver s retained its ability to produce sulfate esters. patients with liver metastases, as much as 60% of inary bile acids were present as sulfate esters, ile this fraction constituted only 2% of serum e acids.

1 INCORPORATION OF 4-^{14}C-CHOLESTEROL IN CHOLESTEROL ESTER FRACTIONS OF HDL, LDL, VLDL IN CIRRHOSIS. *(Ger.)* Weizel, A. (Med. n., Univ. Heidelberg, Germany). *Verh. Dtsch. . Inn. Med.* 78:1365-1367, 1972.

study esterified cholesterol in serum lipopro-n fractions, 2 patients with compensated cirrho- were injected i.v. with 6-30 μCi of 4-^{14}C-lesterol, either in an alcoholic solution or er preincubation with serum. Blood samples were en at regular intervals after injection, and very density (VLDL), low density (LDL), and high sity (HDL) lipoprotein fractions were isolated ultracentrifugation. Esterified and free choles-ol were then separated by thin-layer chromatog-hy, and the specific activities of these frac-ns were determined. In a 65-yr-old man with rhosis and total cholesterol levels of 100-120 100 ml, the ratio of esterified to free choles-ol was decreased to 1.0 (normal values are around 2.2), and esterified cholesterol concentrations were particularly low in the LDL and HDL fractions. However, incorporation of 4-^{14}C-cholesterol into the lipoproteins followed the same pattern as in subjects with normal serum cholesterol levels. The same results were obtained on a 60-yr-old male cirrhotic with total cholesterol levels of 140 mg/100 ml. It is concluded that there are no qualitative or quantitative changes in cholesterol esterification mechanisms due to the decrease in esterified cholesterol levels in cirrhosis.

7162 EFFECT OF AZATHIOPRINE ON CIRRHOSIS IN MAN AND EXPERIMENTAL ANIMALS. *(Ger.)* Perings, E.; Brunner, G.; Creutzfeldt, W. (Med. Clin., Univ. Gottingen, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:946-948, 1973.

Animal studies were performed to account for the deleterious effect of azathioprine on patients with cirrhosis. Of 21 cirrhotics treated with this drug, 10 died during or shortly after discontinuation of azathioprine treatment. Cirrhosis was induced in 122 male Wistar rats by carbon tetrachloride (CCl_4) treatment (0.75 ml s.c. twice a week for 4 months) and in 30 rats by a choline-deficient diet administered for 8 months. Rats were then divided into 4 groups. Group I was given 26 CCl_4 injections, followed by azathioprine (25 mg/kg/day p.o. through an esophageal tube) for 24 days and 6 more CCl_4 injections. Group II received 35 CCl_4 injections followed by a 10 day interval and then the above dose of azathiprine for 4 weeks. Rats with cirrhosis induced by a choline-deficient diet were given the above dose of azathioprine for 4 weeks. About 50% of the azathioprine-treated animals in all 4 groups died within 4 weeks, while only 3 of 62 untreated cirrhotic controls died during the same period. In group II, serum transaminase activities were higher in azathioprine-treated rats than in controls, and histological findings generally correlated with serum transaminase levels, both in animals given CCl_4 and those fed the choline-deficient diet. To rule out the possibility that azathioprine has a toxic effect on the normal liver, 20 normal rats were given 25 mg/kg/day azathioprine p.o. for 90 days. No increases occurred in serum transaminase values, and no liver changes were found in these rats. Although the high mortality in cirrhotics treated with azathioprine cannot be explained, it may be that azathioprine is metabolized at a slower rate by the cirrhotic liver. Cirrhosis is considered to be a contraindication for azathioprine therapy.

7163 HISTOPATHOLOGICAL EVOLUTION OF INDIAN CHILDHOOD CIRRHOSIS WITH EMPHASIS ON CRITERIA OF EARLY DIAGNOSIS. *(E.)* Patel, B. D.; Parekh, S. R.; Chitale, A. R. (Group Hosp., Bombay, India). *Indian Pediatr.* 11(1):19-28, 1974.

7164 SOME OBSERVATIONS ON THE ROLE OF AUTOIMMUNE AND VIRAL FACTORS IN THE AETIOPATHOGENESIS OF INDIAN CHILDHOOD CIRRHOSIS. *(E.)* Mohanty, I. C.; Gupta, S. (Maulana Azad Med. Coll., New Delhi, India). *Indian Pediatr.* 11(1):29-31, 1974.

7165 TISSUE MICROVENOGRAPHY OF THE ADRENAL IN CIRRHOSIS WITH PORTAL HYPERTENSION. *(E.)* Sasano, N.; Horikawa, N.; Nakamura, K. (Tohoku Univ. Sch. Med., Sendai, Japan). *Tohoku J. Exp. Med.* 112 (3):197-203, 1974.

7166 DIRECTION OF PORTAL COLLATERAL FLOW AS AN INDICATION OF THE OPERATIVE RISK IN PORTACAVAL SHUNTS. *(E.)* Adar, R.; Deutsch, V.; Fogel, R.; Mozes, M. (Chaim Sheba Med. Ctr., Tel-Hashomer, Israel). *Vasc. Surg.* 8(3):184-189, 1974.

7167 STUDY OF PANCREATIC ENZYMES BY DUODENAL INTUBATION IN HEPATIC CIRRHOSIS. *(E.)* Patney, N. L.; Mehrotra, M. P.; Jasuja, R. K.; Khanna, H. K.; Kumar, A. (S. N. Med. Coll., Agra, India). *J. Assoc. Physicians India* 22(3):229-236, 1974.

7168 THE EFFECT OF LACTULOSE ON THE FAECAL FLORA OF PATIENTS WITH HEPATIC ENCEPHALOPATHY. *(E.)* Vince, A.; Zeegen, R.; Drinkwater, J. E.; O'Grady, F.; Dawson, A. M. (St. Bartholomew's Hosp., London, England). *J. Med. Microbiol.* 7(2):163-168, 1974.

7169 LIVER DISEASE IN RHEUMATOID ARTHRITIS. *(E.)* Ellman, M. H.; Weis, M. J.; Spellberg, M. A. (Michael Reese Hosp., Chicago, Ill.). *Am. J. Gastroenterol.* 62(1):46-52, 1974.

7170 INDICATIONS FOR SURGERY IN BLEEDING DUE TO PORTAL HYPERTENSION IN CIRRHOTICS. *(Fr.)* Huguier, M. (Rothschild Hosp., Paris, France). *Arch. Fr. Mal. App. Dig.* 63(3):241-250, 1974.

7171 SEVERE BLEEDING CAUSED BY PORTAL HYPERTENSION: INDICATIONS FOR AND RESULTS OF SURGICAL TREATMENT. *(It.)* Marinaccio, G.; Ferrarese, S. (Inst. Clin. Gen. Surg. Surg. Ther., Univ. Bari, Italy). *Chir. Gastroenterol.* 7(3):297-305, 1973.

7172 CHANGES IN ESOPHAGEAL MOTILITY IN PATIENTS WITH ESOPHAGEAL VARICES DUE TO SCHISTOSOMAL PORTAL HYPERTENSION. *(Por.)* Gama-Rodrigues, J. J.; Pinotti, H. W.; Bettarello, A.; Santiago-Montenegro, J. E.; Raia, A. A. (Fac. Med., Univ. Sao Paulo, Brazil). *Rev. Hosp. Clin. Fac. Med. Sao Paulo* 29(1): 23-33, 1974.

7173 SELECTION OF A METHOD FOR SURGICAL TREATMENT OF PATIENTS WITH PORTAL HYPERTENSION RESULTING FROM CIRRHOSIS. *(Rus.)* Shalimov, A. A.; Shchus', V. N.; Korotkii, V. N. (Kiev Inst. Postgrad. Med., USSR). *Vestn. Khir.* 111(11):34-40, 1973.

7174 HEPATIC BLOOD FLOW DETERMINED WITH AN ^{131}I-LABELED MICROCOMPLEX OF HUMAN ALBUMIN. I. VALUES IN NORMAL SUBJECTS AND CIRRHOTICS WITH AND WITHOUT PORTAL SHUNT SURGERY. *(It.)* Giovannelli, C. A.; Crosti, P. F.; Bardi, U.; Vigo, P. L. (Inst. Med. Pathol. Clin. Methodol., Univ. Milan, Italy). *Arch. Ital. Mal. App. Dig.* 37(1):31-48, 1973.

7175 HEPATIC BLOOD FLOW DETERMEND WITH AN ^{131}I-LABELED MICROCOMPLEX OF HUMAN ALBUMIN. III. CHANGES WITH TIME AND CORRELATIONS WITH CLINICAL AND HEMATOCHEMICAL VARIABLES IN CIRRHOTICS WITH AND WITHOUT PORTAL SHUNT SURGERY. *(It.)* Crosti, P. F.; Giovannelli, C. A.; Vigo, P. L.; Bardi, U. (Inst. Med. Pathol. Clin. Methodol., Univ. Milan, Italy). *Arch. Ital. Mal. App. Dig.* 37(2):79-90, 1973.

7176 LIVER FUNCTION IN PATIENTS WITH IRREVERSIBLE COMA. *(Fr.)* DiCostanzo, J.; Lebreuil, G.; Chamlian, A.; Sahel, J.; Sudan, N.; DiCostanzo, J. S.; Gauthier, A. P. (St. Marguerite Hosp., Marseille, France). *Arch. Fr. Mal. App. Dig.* 63(3):187-202, 1974.

7177 USE OF ION-EXCHANGE CHROMATOGRAPHY OF AMINO ACIDS IN ACUTE AND CHRONIC LIVER DISEASE. *(Rus.)* Mironova, I. S.; Semendiaeva, M. E.; Spektor, E. B. (Inst. Pediatr. Pediatr. Surg., Moscow, USSR). *Sov. Med.* 36(6):111-115, 1973.

7178 MACROCYTOSIS IN CIRRHOSIS AND ITS NORMALIZATION DURING THERAPY. *(Ger.)* Becker, H. Mosawi, N. (Munic. Hosp., Frankfurt/Main, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:470-473, 1973.

See also, 6680, 6819, 7056, 7076, 7135, 7136, 7139, 7140, 7141, 7142, 7143, 7147, 7148, 7151, 7325.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

7179 THE ORGANIC MATRIX OF GALLSTONES. *(E.)* Sutor, D. J.; Wooley, S. E. (Dept. Chem., Univ. Coll., London, England). *Gut* 15(6):487-491, 1974.

Cholesterol gallstones were dissolved in chloroform and sodium chenodeoxycholate solutions, while calcium carbonate and calcium phosphate stones were dissolved in hydrochloric acid and tetrasodium or di-odium salts of ethylenediaminetetraacetic acid. n all cases dissolution left an amorphous and gel-ike matrix. The matrix from cholesterol stones could e colorless but was usually orange, yellow, or brown hile that from calcium carbonate and calcium phos-hate stones was almost invariably black or dark rown. X-ray diffraction photographs and figure nalysis suggested that these pigments were also or-anic and amorphous. The amount of matrix present nd its structure varied with the texture of the rystalline material. Irrespective of their compo-ition, laminated stone areas yielded a compact ma-rix of the same shape as the original material, hile areas of loose crystalline material gave small ieces of noncohesive matrix. Only large cholesterol tones, which usually radiated from the stone nucleus, ad no associated matrix. The close structural rela-ion between crystalline material and matrix in gall-tones indicates that their deposition is in some way onnected. The relative roles played by each in the ucleation and growth of a stone cannot usually be educed; but in radiating cholesterol crystals with-ut observable matrix, crystal growth occurred inde-endently of the substance. Small pieces of choles-erol gallstones dissolved *in vivo* by chenodeoxycholic cid could remain in the gallbladder and act as a idus for further stone formation if the bile is in supersaturated state. Such growth will occur at a uch lower level of supersaturation than required for omogeneous nucleation and stone formation is there-ore more likely to recur.

7180 SURGICAL INDICATIONS IN PATIENTS WITH SILENT GALLSTONES. *(E.)* Sato, T.; Matsushiro, T. (Tohoku Univ. Sch. Med., Sendai, Japan). *Am. J. Surg.* 128(3):368-375, 1974.

Characteristics of patients with silent and symptomatic cholecystolithiasis were studied. Silent gallstones were found in 32 of 784 surgically treated patients with cholelithiasis and were composed of cholesterol in 24 cases and pure pigment in 8. Only 2.8% of 217 patients younger than 49 yr had silent cholesterol stones compared with 7.3% of 109 patients aged 50-59 yr, 7.4% of 81 patients aged 60-69 yr, and 20% of 20 patients > 70 yr. This age-related trend was not observed with pure pigment stones. In 152 subjects with gallstones proved at autopsy, the incidence of silent gallstones (type unspecified) was also high among aged patients. Patients with silent stones and those with cholecystolithiasis at the intermediate stage did not differ with respect to number of stones, presence of bacteria in bile, or histological changes in the gallbladder wall in relation to composition of stones. Inflammatory changes in the wall of the gallbladder were most prominent with cholesterol stones followed by pure pigment stones, with comparatively slight changes in patients with calcium bilirubinate stones. Onset of symptoms in patients with silent gallstones was more sudden in the older age groups and was frequently accompanied by acute cholecystitis. Operative mortality was 8.8% for patients hospitalized with acute disease compared with 0.2% for patients with disease at the intermediate stage. The incidence of cancer of the gallbladder associated with gallstones increased with age, occurring in 3.8% of men and 9.3% of women older than 60 yr. The data indicate that up to age 30 patients with cholecystolithiasis should be treated conservatively. Conversely, early cholecystectomy is recommended for patients aged 40-70 yr and even for older patients who are still active.

7181 USE OF C-TERMINAL OCTAPEPTIDE OF CHOLECYSTOKININ IN CHOLECYSTOGRAPHY. *(E.)* Levant, J. A.; Sturdevant, R. A. L. (VA Wadsworth Hosp. Ctr., Los Angeles, Calif.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(2):380-383, 1974.

The effect of the C-terminal octapeptide of cholecystokinin (20 ng/kg, i.v.) on gallbladder contraction was investigated in 30 patients (29 men and 1 woman, mean age 48.6 yr) undergoing oral cholecystography. The common bile duct was visualized in 14 (47%) patients after this administration. Mean peak decrease in gallbladder size, measured at 5, 10, and 15 min after injection, was 48% with a range of 10-100%. Peaks occurred at 5 min in 5 patients, at 10 min in 12, and at 15 min in 13; the mean decreases in size for the 3 time periods were not significantly different. In 4 patients, decrease in gallbladder size was less than 40%. An additional i.v. injection of 40 ng/kg cholecystokinin octapeptide in these 4 patients produced further contraction in only 1 patient. Common bile duct visualization was not increased by a 2nd injection of 40 ng/kg. The side effects in 25 patients were mild (nausea in 15 patients; abdominal cramps, 9; and abdominal pressure or other discomfort, 9), transient, and well tolerated. No evidence of toxicity was found on physical examination or laboratory evaluation 24 hr after administration. This study provides evidence that the cholecystokinin octapeptide is safe and effective for use as a gallbladder contracting agent in humans. Although the diagnostic value of gallbladder contraction is uncertain, possible advantages include visualization of gallstones not seen without contraction, visualization of bile ducts and choledocholithiasis, reproduction of spontaneous pain of biliary dyskinesia, correlation of the pain with roentgenographic features, and possible prediction of future cholelithiasis.

7182 THE ROLE OF BILE ACIDS IN THE PATHOGENESIS OF POSTVAGOTOMY DIARRHOEA. *(E.)* Allan, J. G.; Gerskowitch, V. P.; Russell, R. I. (Roy. Infirm., Glasgow, Scotland). *Br. J. Surg.* 61(7): 516-518, 1974.

Fecal bile excretion was analyzed over a 5-day period in 7 patients (5 women and 2 men, 30-59 yr old) with continuous, severe diarrhea after vagotomy and drainage surgery 3-8 yr previously, in 7 volunteer normal controls, and in 7 nondiarrheic patients after vagotomy and drainage operation 2 yr previously. The total bile acid secretion in the feces was significantly increased in the patients with diarrhea (2538 mg/day) compared with normal controls (799 mg/day). Although no significant difference in total fecal bile acid excretion was observed between the 2 groups of patients with vagotomy, a significant increase in the fecal excretion of chenodeoxycholic acid was found in the patients with diarrhea (460 mg/day) as opposed to the other 2 groups (170 in patients without diarrhea and 82 in controls. There was no statistically significant difference in the excretion of cholic acid, deoxycholic acid, or lithocholic acid between the postvagotomy diarrhea group and the controls. Histology study showed normal villous structure in the jejunum in all patients with diarrhea. It is suggested that the increase in chenodeoxycholic acid excretion may be a factor in the pathogenesis of postvagotomy diarrhea.

7183 ALTERATIONS IN THE CONCENTRATION OF CHOLESTEROL IN BILE AFTER ADMINISTRATION OF HUMAN GROWTH HORMONE.

(E.) Poley, J. R.; Smith, J. D.; Thompson, J. B.; Seely, J. R. (Children's Mem. Hosp., Oklahoma City, Okla.). *Pediatr. Res.* 8(7):710-714, 1974.

The concentration and molar percentage of cholesterol, bile acids, and phospholipids were measured over an 18-month period in 3 neonates with growth hormone deficiency and in 1 control neonate with constitutionally short stature but normal growth hormone secretion. Investigations were made before and after 0.3, 4, and 12 months of therapy with exogenous human growth hormone (3 U/week). Two hormone-deficient patients showed accelerated height velocities of 1.3 and 0.2 cm/yr to 10.5 and 3.0 cm, resp., after 4 months of treatment. During this time, the lithogenic index (ratio between cholesterol concentration in a given bile sample and the maximal cholesterol concentration that could be dissolved in the sample) rose from 1.00 and 0.93 initially to 1.66 and 1.10, resp., indicating a progressive increase in bile concentration, since normal lithogenic index is 1.00. The 3rd patient also showed some growth acceleration, but his bile did not become oversaturated with cholesterol. After 0.3 month of growth hormone treatment, the control subject exhibited a height velocity increase from 2.8 to 8.0 cm/yr; his bile was excessively saturated with cholesterol levels as indicated by a rise in the lithogenic index from 0.10 to 2.94, the highest yet reported for humans. However, this abnormal response to human growth hormone was not sustained, and bile composition later returned to normal. These findings suggest that human growth hormone influences hepatobiliary cholesterol dynamics associated with bile production.

7184 LONG-TERM RESULTS OF HEPATIC PORTOENTEROSTOMY FOR BILIARY ATRESIA: SPECIAL REFERENCE TO POSTOPERATIVE PORTAL HYPERTENSION.

(E.) Miyata, M.; Satani, M.; Ueda, T.; Okamoto, E. (Osaka Univ. Med. Sch., Japan). *Surgery* 76(2):234-237, 1974.

Over a 4-yr period, 51 infants (aged 1-5 months) with congenital biliary atresia underwent Roux-en-Y portoenterostomy. Jaundice disappeared completely in only 15, all of whom were under age 4 months at time of surgery. Ten patients died within 1 month postoperatively due to complications. Four patients in whom jaundice disappeared died from portal hypertension within 18-41 months of surgery. Portal hypertension was also the cause of death in all but 6 of the 22 jaundiced patients who died 2-18 months postoperatively. While portal hypertension was only apparent postoperatively in the patients in whom jaundice disappeared, it was evident preoperatively in those with persistent jaundice. Among patients in whom jaundice disappeared, 5 of a total of 7 with portal hypertension (71.4%) developed retrograde cholangitis. This suggests a close relation between retrograde cholangitis and postoperative portal hypertension.

7185 SUCCESSFUL RESECTION OF CARCINOMA OF THE COMMON HEPATIC DUCT AT ITS SUPERIOR BIFURCATION.

(E.) Camprodon, R.; Salva, J. A.; Jornet, J.; Guerrero, J. A. (Francisco Franco Munic. Sanit., Barcelona, Spain). *Am. J. Surg.* 128(3):433-435, 1974.

A 61-yr-old man presented with progressive jaundice, asthenia and anorexia, and a weight loss of 10 kg in 1 month. Physical examination showed marked hepatomegaly without tenderness and a nonpalpable gallbladder. At surgery, the liver was enlarged, the gallbladder flaccid, and the common bile duct small in circumference. Preoperative diagnosis of carcinoma of the common hepatic duct at its superior bifurcation was established by retrograde cholangiography of the common bile duct and the intrahepatic vessels by transhepatic puncture. Resection of both hepatic ducts was performed at the level of the umbilical notch, and continuity of the biliary-digestive system was reestablished by hepaticojejunostomy with a Roux-en-Y loop. Postoperatively, the pigmentation of the skin returned to normal and the patient gained 8 kg within 3 months. His condition remains satisfactory 16 months postoperatively.

7186 COMPARATIVE STUDY OF VARIOUS TECHNIQUES FOR X-RAY CONTRASTING OF THE BILIARY TRACT.

(Rus.) Lisitsyn, K. M.; Severova, N. S.; Vorotnikova, R. P. (Central Milit. Hosp., Moscow). *Vestn. Khir.* 111(12):32-34, 1974.

The purpose of the study was to compare diagnostic values of i.v. drip cholegraphy with alternative methods of contrasting the biliary tract. In 3 yr, 890 contrast X-rays were taken of the biliary tract of 758 patients. There were 700 peroral cholecystographies, 58 i.v. and 132 drip-i.v. cholegraphies. The latter involved i.v. drip injection of 150-200 ml of 5% glucose solution with 40-60 ml of 20% bilignost (1 ml/kg) heated to 37 C mixed with insulin (0.3 - 0.5 U/kg) and s.c. injection of 0.5 ml of 1% morphine hydrochloride. The technique produced clear contrasting of the biliary tract in 88% of the patients and was twice as efficient as the conventional i.v. choleography. This technique is recommended for studies of the biliary tract after cholecystography or when other methods fail to yield a contrasting image. Intravenous cholegraphy by drip infusion provides a sharp image of the biliary tract. The absence of the gallbladder contrasting is a sign of the bladder obstruction and an indication for surgery. Counterindications are kidney deficiencies with oliguria.

37 CLINICAL AND MORPHOLOGICAL CHARACTERISTICS OF BILIARY ATRESIA AND CONGENITAL HEPATI-

. *(Rus.)* Rudenskaia, I. N.; Gavriushov, V. V.;
kovskaia, A. I. (I. V. Rusakov Clin. Hosp.
liatrics No. 2, Moscow, USSR). *Pediatriia* (1):37-
1973.

hough clinical findings were similar in 36 child-
(23 boys and 13 girls) with biliary atresia and
children (16 boys and 11 girls) with congenital
atitis, patients with congenital hepatitis had
nificantly lower birth weights; slower weight
ns; and a higher incidence of developmental de-
ts, associated diseases, and bleeding. While
ndice developed a few days after birth in all
ldren with biliary atresia and in 17 of those with
genital hepatitis, 10 in the latter group did not
elop jaundice until age 2 weeks to 7 months.
le jaundice was persistent in patients with bil-
y atresia, it regressed in 8 patients with con-
ital hepatitis and was recurrent in 3 others.
iary anomalies were successfully corrected by
gery in only 3 of the 24 operated patients with
iary atresia. The remaining patients in this
up had anomalies which could not be corrected
gically. Biopsies performed on 30 of 36 children
h biliary atresia all showed marked periolobular
rosis and some with biliary cirrhosis had actively
liferating bile canaliculi, pronounced cholesta-
, and bile thrombi and bile "lakes". Other com-
findings were infiltrates of lymphocytes and
tiocytes in the stroma and parenchyma, parenchy-
dystrophy, and giant cell transformation. Biop-
es performed on 20 of the 27 children with congeni-
hepatitis showed subacute giant cell cholestatic
atitis (13 cases), congenital giant cell hepa-
is progressing to cirrhosis (6 cases), and acute
al hepatic necrosis (1 case). During the first
months of life no differences were found between
lesterol and bilirubin levels and SGOT and SGPT
ivities in children with biliary atresia and those
h congenital hepatitis. Liver failure was respons-
le for all of the 23 deaths that occurred among
ldren with biliary atresia and for 13 of the 17
aths among children with congenital hepatitis. Al-
ough it is not always possible to establish a dif-
rential diagnosis between these 2 diseases by liver
opsies and laparoscopy, laparotomy is not recom-
nded because of the serious consequences that can
sult in patients with congenital hepatitis and
cause the hepatitis may regress in some of these
ildren. The complement fixation test for toxo-
asmosis was positive in only 1 child with biliary
resia, and cytomegalic inclusion virus was iso-
ted from 3 children with biliary atresia and 1
th congenital hepatitis.

38 ADENOMATOUS POLYP OF THE HEPATIC DUCT WITH OBSTRUCTIVE JAUNDICE: ONE CASE REPORT.

or.) Biccas, Jr., L.; Cabas, R. V.; Goncalves, C.
(Clin. Hosp., Fed. Univ. Espirito Santos, Vitoria,
azil). *Arq. Gastroenterol. (Sao Paulo)* 11(3):173-
7, 1974.

A 42-yr-old woman with a history of 3 episodes of jaundice which regressed spontaneously presented with pain in the right hypochondrium and epigastric region, jaundice, and pruritis. An oral cholecystogram, taken 1 yr previously, showed a nonfunctioning gallbladder. A provisional diagnosis of choledocholithiasis was established. At laparotomy the common hepatic duct was dilated right above its junction with the cystic duct. Palpation revealed the presence of a soft, mobile tumor, the consistency of which differed from that of gallstones or malignant neoplasms. The common bile duct was normal and the gallbladder was edematous, had thickened walls, but contained no calculi. When the common bile duct was dissected, a pedunculate tumor was found in the common hepatic duct with its base in the right hepatic duct and its distal extremity blocking the proximal common bile duct. After complete removal of the tumor, a choledochostomy was performed, followed by insertion of a T-drain and a cholecystectomy. Histological examination of the tumor disclosed that it was an adenomatous polyp. Apparently the mobility of the polyp accounts for the intermittent nature of the jaundice in this patient. Obstruction of the common bile duct was intermittent and was reduced when the patient was in dorsal decubitus. Postoperative cholangiograms were normal, confirming that only a single polyp was present.

7189 BILE LIPOPROTEIN CONCENTRATIONS IN CHRONIC BILIARY DISEASE IN CHILDREN. *(Ukr.)*

Donde, S. M. (Kiev Sci. Res. Inst. Pediatr. Obstet. Gynecol., USSR). *Pediatr. Akush. Ginekol.* 36(2):18-19, 1974.

Lipoprotein concentrations were determined by paper electrophoresis on gallbladder and hepatic bile from 144 children (99 girls and 45 boys, aged 5-14 yr) with acute biliary disease. Of these patients, 71% had bacterial angiocholecystitis, 13% had giardiasis, and 16% had biliary dyskinesia. Controls consisted of 22 normal children of the same ages. Most of the patients had associated infections; 40% had helminthiasis; stomach disorders were diagnosed in 48%, including 27% with chronic gastritis; and liver function tests were abnormal in 48 of these 144 patients. Lipoprotein concentrations in both gallbladder and hepatic bile samples were significantly lower in patients with bacterial angiocholecystitis and giardiasis than in controls. Biliary lipoprotein concentrations did not differ appreciably between patients with biliary dyskinesia and controls. A relation was found between the extent to which bile lipoprotein concentrations were decreased and the duration of the disease: lipoprotein concentrations remained essentially unchanged in children with histories of 1 yr or less, while concentrations were significantly decreased in children with histories of longer than 1 yr. This can probably be explained by involvement of the liver and impairment of its bile-secreting function in biliary disease of long duration. A correlation was found between the extent to which lipoproteins were decreased and the severity of biliary inflammation. However, bile lipoprotein concentrations were also decreased in children who had large amounts of mucus and many epithelial cells and WBC in their duodenal contents and in children with 5-10 WBC/field in their bile. While lipoprotein concentrations tended to normalize in gallbladder bile after treatment, their concentrations in hepatic bile remained decreased despite regression of clinical symptoms. It is likely that 3-4 weeks of treatment in the hospital is not enough to restore normal bile secretion by the liver in chronic biliary disease, and patients should be treated on an outpatient basis. Determination of bile lipoprotein concentrations is recommended as a valuable test that reflects hepatobiliary function.

7190 RECURRENT CHOLESTASIS INDUCED BY ORAL CONTRACEPTIVES IN PRIMARY SCLEROSING CHOLANGITIS. *(Ger.)* Hartmann, W.; Goebell, H.; Beneke, G.; Ruhle, K. H. (Ctr. Intern. Med. Pediatr., Univ. Ulm, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:964-967, 1973.

A 24-yr-old woman with a history of colic-like pain in the upper right abdomen, associated with transient jaundice and fevers up to 40 C, developed jaundice, pruritis, and a fever after ingestion of an oral contraceptive. Although the drug was discontinued, jaundice recurred after 9 months, and the patient noted that she developed a fever every month about 10 days before each menstrual period. A trial of Eugynon (composition not specified) induced persistent cholestasis and hepatosplenomegaly. Increases occurred in the erythrocyte sedimentation rate; bilirubin, γ-globulin, and serum copper levels; and alkaline phosphatase and leucine aminopeptidase activities. These abnormalities persisted for about 1 yr. Primary biliary cirrhosis was ruled out by a failure to find antimitochondrial antibody. Laparotomy showed thickening and stenosis of the common and intrahepatic bile ducts with perilobular fibrosis and intimal proliferation in branches of the portal vein. Granulomas in the hepatoduodenal ligament were strikingly similar to rheumatoid nodules found in rheumatoid arthritis. Postoperative recurrence of fever and jaundice was successfully treated with fluocortolone (10 mg/day). These findings suggest that primary sclerosing cholangitis may only be a manifestation of some systemic collagen disease. The cyclical course of cholestasis might be attributed to swelling of collagen connective tissue in the affected bile ducts caused directly by sex hormones.

7191 LONG-TERM AND VERY LONG-TERM FUNCTIONAL RESULTS OF CHOLEDOCHODUODENOSTOMY. *(Fr.)* Mallet-Guy, P. (no affil.). *Chirurgie* 99(8):505-511, 1973.

Of 563 side-to-side choledochoduodenostomies performed over a 20-yr period, 56 were performed for neoplastic obstructions. The remaining 507 patient with non-neoplastic lesions underwent 316 operation and 191 reoperations for post-cholecystectomy syndrome. Mortality during the first 60 days after surgery averaged 13% and increased with the age of the patients. Of these 507 patients, 336 were followed for 1-24 yr after surgery. Primary operation and reoperations for recurrent lithiasis were successful in 89-92% of the patients, in contrast to 76.7-78.5% of patients with postcholecystectomy syndrome due to other causes. Clinical and radiologically confirmed recurrences developed after several years in 39 patients (11.6% of the patients followe for more than 1 yr). In 25 cases failure resulted from partial or complete obliteration of the mouth of the anastomosis; this complication was more comm in reoperated patients. Another cause of failure was overlooked stones (7 cases). Since symptoms occurred only at long intervals 3 patients did not undergo further surgery, and symptoms subsided afte extraction of an abscessed tooth in another patient Thus, only 3 of the 336 patients followed (0.9%) could be classified as true failures. These findin indicate that ascending cholangitis does not occur very often after choledochoduodenostomy.

7192 CARCINOMA OF THE GALLBLADDER AND EXTRAHEP TIC BILIARY TREE. *(E.)* Johnson, F. W.; Gilsdorf, R. B. (VA Hosp., Minneapolis, Minn.). *Am Surgeon* 40(8):456-461, 1974.

7193 CARCINOMA OF GALLBLADDER IN IBADAN. *(E.* Adekunle, O. O.; Itayemi, S. O.; Ajayi, O. (Univ. Coll. Hosp., Ibadan, Nigeria). *J. Roy. Coll. Surg. Edinb.* 19(3):168-172, 1974.

7194 A DEFINITION OF LITHOGENIC BILE. *(E.)* Holzbach, R. T. (Gastrointestinal Res. Unit, Cleveland Clin., Ohio).` *Cleve. Clin. Q.* 41 (2):55-59, 1974.

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GENERAL

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NITROCHLOROBENZENE IN GASTROINTESTINAL CANCERS. .) Bone, G.; Appleton, D. R.; Venables, C. W. ept. Surg., Univ. Newcastle upon Tyne, England). . *J. Cancer* 29(5):403-406, 1974.

e relation between the initial delayed hypersensi-
vity reaction to 1-chloro-2,4-dinitrobenzene,
llowing sensitization, in patients with gastroin-
stinal cancers and their subsequent survival has
en studied. The 70 patients (38 males and 32 fe-
les, aged 36-81 yr) were sensitized by the appli-
tion of 4000 μg of 1-chloro-2,4-dinitrobenzene
ssolved in acetone and applied to a 3 cm^2 area of
in on the volar aspect of the forearm. At least
days after sensitization, 4 patch test squares
ch impregnated with a different strength of 1-
loro-2,4-dinitrobenzene in acetone were applied to
e opposite forearm. The patients were then graded
cording to sensitivity as follows: I, sensitive
200 μg only; II, sensitive to 200 and 100 μg;
I, sensitive to 200, 100 and 40 μg; and IV, sensi-
ve to all strengths of 1-chloro-2,4-dinitrobenzene
sted. The cancer patients were divided almost
ually among the 4 groups with no significant dif-
rence between the proportions in each group. All
t one of the control patients showed a delayed
persensitivity reaction for 1-chloro-2,4-dinitro-
nzene and the majority were graded III. Studies of
rvivors showed a striking correlation between
eir relative anergy and their subsequent progress.
e prognosses for group IV responders was the most
vorable with a progressive decline showing dimi-
shed initial response. A clear linear relation
ists between the strength of the delayed hypersen-
tivity response to an exogenous allergen (1-chloro-
4-dinitrobenzene) and the short-term prognosis in
tients with gastrointestinal cancers. Since pa-
ents who were anergic had only a 20% chance of
rviving for 6 months, it is questionable whether
dical surgery is justified in such patients un-
ss something can be done to reverse their "aner-
c" state. Routine use of the delayed hypersensi-
vity test in gastrointestinal cancer patients may
useful in clinical assessment and lead to changes
management.

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An immunoadsorbent process had been devised for removing serum hepatitis antigen (HAA), from blood, blood plasma, and plasma products. The immunoadsorbent complexes specifically with HAA. The complex is then removed from the plasma by filtration. Ammonium hydroxide (0.23 M) is used to dissociate the complex. The immunoadsorbent is regenerated for further processing, while the purified HAA by-product may be used to produce more antibody in animals. The rate of complexing is such that HAA is reduced one log cycle each 2 hr. Since available tests can only detect HAA to about 10^9 particles/ml, it is proposed that HAA negative plasma and plasma products can be processed to reduce HAA to a probability of less than one HAA particle/plasma pool. A gibbon injected with infectious commerical Factor IX that was subjected to the immunoadsorbent process showed no sign of infection after 8 months. However, 14 weeks after injection with unprocessed Factor IX, the gibbon showed signs of infection. This is considered presumptive evidence of infection by the unprocessed Factor IX. More than 80% of the Factor IX was recovered from the immunoadsorbent process.

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GENERAL

Parasitology

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sponse to metronidazole therapy was analyzed in 15
tients with colonic amebiasis (12 with acute amebic
sentery and 3 with coexisting liver abscesses) and
12 patients with amebic liver abscesses treated
thout aspiration. The 15 patients (10 men and 5
men, aged 18-49 yr) with amebic colitis received 750
metronidazole 3 times/day for 5-25 days. Diarrhea
ased in all dysenteric patients within 24-120 hr,
d fever was reduced in 10 patients in 24-72 hr. Af-
r one course of treatment 2 patients developed clin-
al and parasitological relapses. One became clini-
lly well after a 2nd 10-day course of metronidazole
d had negative stools at 6 weeks. The other patient
s retreated for 5 days with a good clinical response
t had positive stools 10 days later. She was cured
th tetracycline, emetine, and diiodohydroxyquin.
e asymptomatic patient with cysts of *Entamoeba his-*
lytica responded to 5 days of treatment; stools were
gative 2 months after treatment. The 12 patients
ales, aged 20-39 yr) with hepatic amebiasis were al-
treated with 750 mg metronidazole 3 times/day for
26 days, without aspiration. All patients were fe-
ile on admission. Duration of fever and pain, if
esent, was 24-240 hr after institution of therapy.
ither duration of illness nor size of the abscess
d predictable correlation with response to therapy
healing rate of the abscess. All patients were
inically well at the last follow-up examination.
4 patients with abscesses, there was evidence of
lmonary involvement prior to therapy; in 1 of these,
apparent progression of the disease occurred with
rupture of the abscess into a bronchus, but the pa-
ent responded to reinstitution of metronidazole.
de effects of the drug were minimal in both groups.
e data indicate that 750 mg metronidazole 3 times/day
r 5 days is adequate therapy for amebic dysentery.
en aspiration is not part of treatment for hepatic
ebiasis, the same dosage for 10 days should be ade-
ate; if necessary, therapy can be prolonged without
gnificant toxicity.

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See also, 6968, 7007, 7085, 7172, 7207, 7213, 7232. 7271.

GENERAL

Regional Enteritis

7330 INCIDENCE OF GRANULOMA IN CROHN'S DISEASE. *(E.)* Assarsson, N.; Raf, L. (Serafimer Hosp., Stockholm, Sweden). *Acta Chir. Scand.* 140(3): 249-251, 1974.

Reports on 287 surgical cases of Crohn's disease were analyzed for the occurrence of tuberculoid granuloma and giant cells in resected material. Granuloma and/or giant cells were noted in 63% of the patients. The incidence of such changes was significantly higher in children and young people than in other age groups. Of 99 patients 19 yr old or younger, 84% had positive findings compared with 45% of 54 patients aged 40-79 yr. The site of the intestinal changes did not differ significantly between groups with and without granuloma. Extensive changes involving more than 50 cm of the intestine were found in 34% of patients with specific changes compared with 25% of those without such changes. The left colon was involved in 27% of patients with granuloma and in 18% of those without specific changes. The two groups did not differ with regard to course and prognosis of the disease. Reoperation had been performed on 28% of patients with specific changes and on 25% of those without.

7331 CROHN'S DISEASE OF THE DUODENUM (TRANSMURAL DUODENITIS). *(Fr.)* Farmer, R. G.; Hawk, Jr., W. A.; Turnbull, Jr., R. B. (Cleveland Clin. Fdn., Ohio). *Ann. Gastroenterol. Hepatol. (Paris)* 9(3):249-254, 1973.

Of 1150 patients treated for Crohn's disease, 14 (7 males and 7 females, aged 13-55 yr) had symptoms which primarily involved the duodenum. Of these 14 patients, 8 had a history of enteritis or Crohn's disease of the colon and 6 presented with duodenal symptoms. Clinical symptoms were suggestive of upper intestinal obstruction in 8 cases and of atypical duodenal ulcers in 4; 2 patients had both types of symptoms. Clinical and radiological evidence of obstruction of the 1st and 2nd parts of the duodenum were found in 10 of the 14 patients. Complications consisted of cutaneous fistulas (3 cases) and perirectal abscesses (3 cases). Surgery for duodenal lesions was performed on 11 of the 14 patients: for obstruction in 7, for ulcer in 3, and for both indications in 1 case. At surgery all 11 patients were also found to have lesions of the ileum and 3, lesio of the jejunum; 1 later developed colitis. Gastroenterostomies designed to bypass inflamed and/or obstructed parts of the duodenum were performed on 9 patients. One patient underwent a duodenojejunostom and another an antrectomy combined with gastrojejuno stomy. No vagotomies were performed. All of these patients are alive after 6 months to 5 yr. Little o no symptoms of duodenal involvement have been obser in 12 patients. One patient who had been treated conservatively had to undergo duodenal bypass becau of a relapse, and another patient developed gastrointestinal bleeding but surgery proved unnecessary. These findings indicate that Crohn's disease of the duodenum is more common than previously recognized, and patients may present with duodenal symptoms.

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1978.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans	It.	Italian
Ar.	Arabic	Jap.	Japanese
Bul.	Bulgarian	Kor.	Korean
Ch.	Chinese	Latv.	Latvian
Cz.	Czech	Lith.	Lithuanian
Dan.	Danish	Nor.	Norwegian
Dut.	Dutch	Pol.	Polish
E.	English	Por.	Portuguese
Eston.	Estonian	Rum.	Rumanian
Fin.	Finnish	Rus.	Russian
Fl.	Flemish	Ser.	Serbo-Croatian
Fr.	French	Sl.	Slovak
Ger.	German	Sp.	Spanish
Gr.	Greek	Sw.	Swedish
Heb.	Hebrew	Th.	Thai
Hun.	Hungarian	Turk.	Turkish
Ic.	Icelandic	Uk.	Ukrainian
In.	Indonesian	Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	mm	millimeter(s)
ADP	adenosine diphosphate	MTD	maximum tolerated dose
AMP	adenosine monophosphate	NAD	nicotinamide adenine dinucleotide
ATP	adenosine triphosphate	NADH	reduced nicotinamide adenine dinucleotide
BSP	sulfobromophthalein	NADP	nicotinamide adenine dinucleotide phosphate
C	degrees centigrade	NADPH	reduced nicotinamide adenine dinucleotide phosphate
cm	centimeter(s)	ng	nanogram (10^{-9})
CNS	central nervous system	pg	picogram (10^{-12})
cpm	counts per minute	p.o.	orally
DNA	deoxyribonucleic acid	ppm	parts per million
e.g.	for example	r	Roentgen
g	gram(s)	RBC	red blood cells (erythrocytes), red blood count
μg	microgram(s)	resp.	respectively
hr	hour(s)	RNA	ribonucleic acid
i.m.	intramuscular	s.c.	subcutaneous
i.p.	intraperitoneal	sec	second(s)
IU	international unit(s)	SGOT	serum glutamic-oxalacetic transaminase
i.v.	intravenous	SGPT	serum glutamic-pyruvic transaminase
kg	kilogram(s)	U	unit(s)
LD_{50}	median lethal dose(s)	UV	ultraviolet
LDH	lactic acid dehydrogenase	WBC	white blood cells (leukocytes), white blood count
m	meter(s)	yr	year(s)
M	molar, Mole(s)		
mEq	milliequivalent(s)		
mM	millimolar, millimole(s)		
μM	micromolar, micromole(s)		
mCi, μCi	milli-, microcurie(s)		
mg	milligram(s)		
min	minute(s)		
ml	milliliter(s)		

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

7334 THE ULTRASTRUCTURE OF THE SMALL INTESTINAL MUCOSA IN THE DEVELOPING HUMAN FETUS. *(E.)*

Varkonyi, T.; Gergely, G.; Varro, V. (Univ. Med. Sch., Szeged, Hungary). *Scand. J. Gastroenterol.* 9(5):495-500, 1974.

The submicroscopic structure of the jejunum was examined in 3 groups of human fetuses corresponding to 6-8 weeks, 8-10 weeks, and 10-12 weeks gestation. The tissues were fixed in 2.5% glutaraldehyde, washed with phosphate buffer, and postfixed in 1% osmium tetraoxide. The material was dehydrated in graded alcohol series and embedded in Durcupan. Preparations were evaluated with a JEM 100 B electron microscope. In the 6-week-old embryo, the epithelium of the small intestinal mucosa is formed by a single layer of epithelial cells arranged radially toward the lumen. There are no microvilli except for some cytoplasmic protuberances; nuclei, mitochondria, rough endoplasmic reticulum are seen in the cytoplasm. In the 8th to 10th week of gestation the epithelial cells differentiate and appear as a cylindrical cell layer. Microvilli begin to appear as well as a massive amount of glycogen granules in the cytoplasm. The cells lie on a basal membrane at this period. In the 10th to 12th week period, the cells begin to resemble enterocytes without forming villi structures. At the surface, the so-called glycocalyx structure appears. The cytoplasm contains all the organelles that are seen in the earlier period of gestation except that they are more developed in this period. Enterochromaffin cells and some goblet cells are observed only in the 12th week of gestation. The results show that the morphological basis of absorption, the small intestinal barrier, develops in the first 3 months of pregnancy. The mucosa at this stage of development is very similar to that seen in advanced stages of absorptive disturbances in adult mucosa e.g., in the sprue syndrome. Further investigations may lead to an understanding of the mechanism of mucosal damage in human malabsorption.

7335 DEVELOPMENT OF STRIATED MUSCLE FIBRES IN THE HUMAN OESOPHAGUS. *(E.)*

Jit, I.; (Inst. Med. Educ. Res., Chandigarh, India). *Indian J. Med. Res.* 62(6):838-844, 1974.

Development of the striated muscle fibers in the muscular coat of the human esophagus was studied in 12 closely graded embryos between 11.5 and 158 mm C.R. stages. The 38 mm C.R. stage was the first stage to show striations appearing in the upper 1/3 of the esophagus in a few inner fibers of the longitudinal coat and adjacent fibers of the circular coat. The inner fibers of the longitudinal coat and the outer fibers of the circular coat showed striations at the 42 mm stage in the upper 1/3 of the esophagus. The middle 1/3 of the esophagus demonstrated striations in a few inner fibers of the longitudinal muscle coat at the 68 mm stage. There was no further progress in muscular striations from the 75 to 99 mm C.R. stages. All of the fibers of the longitudinal coat and most of the circular coat except the innermost layers of the upper 1/3 of the esophagus and some fibers of both coats of the middle 1/3 had striations at the 110 mm C.R. stage. At the latter stage and the 158 mm stage, there was still no evidence of striations in the lower 1/3 of the esophagus. In the development of striated muscles, the coarse myofibrils show granules which remain united by the intervening portions of the myofibril. The granules assume a quadrilateral shape and the fiber assumes a striated appearance in the direction of the long axis of the fiber. The breadth of these granules increases and splitting occurs in the longitudinal direction--the muscle fiber then appears cross striated. The results do not support the suggestion that pharyngeal musculature spreads onto the esophagus.

7336 MORPHOLOGY AND CELL PROLIFERATION OF SUBEPITHELIAL FIBROBLASTS IN ADULT MOUSE JEJUNUM. II. RADIOAUTOGRAPHIC STUDIES. *(E.)*

Marsh, M. N.; Trier, J. S. (Harvard Med. Sch., Boston, Mass.). *Gastroenterology* 67(4):636-645, 1974.

Cell proliferation and migration of subepithelial fibroblasts in the jejunal mucosa of adult Charles River mice was studied by high-resolution light-microscopic radioautography. Animals received 6 i.p. injections of ^{3}H-thymidine (25 μC; specific activity, 6.1 μC/mM) at hourly intervals. In the first 12 hr after exposure to isotope, labeled subepithelial fibroblasts were found only in the crypt region, indicating that only pericryptal fibroblasts synthesized DNA and proliferated. By 24 hr, labeled fibroblasts were seen in the proximal and middle 1/2 of the villi, and by 36 hr, labeled fibroblasts appeared in the distal 1/3 of the villi. Thus, there appeared to be migration of subepithelial fibroblasts from the pericryptal lamina through the subepithelial tissues of the villi toward the villus tips. In contrast, endothelial cells were labeled at all levels of the mucosa 6 hr after exposure to ^{3}H-thymidine, indicating that these cells are capable of proliferation regardless of their location within the mucosa. Fibroblasts and epithelial cells migrated in synchrony to the base of the villi; thereafter, labeled fibroblasts appeared to migrate more rapidly to the tips of the villi than did labeled epithelial cells. Radiation damage, observed in crypt epithelial cells, may have interfered with epithelial cell proliferation and migration.

7337 PATTERN OF OSMIUM DEPOSITION IN THE PARIETAL CELLS OF THE STOMACH. *(E.)*

Winborn, W. B.; Seelig, Jr., L. L. (Univ. Texas Health Sci. Ctr., San Antonio). *J. Cell Biol.* 63:99-108, 1974.

7338 THE SURGICAL ANATOMY OF THE PORTA HEPATIS. *(E.)*

McArthur, M. S.; Hiatt, J.; Bastounis, E. A. (Univ. California Sch. Med., Los Angeles). *J. Surg. Res.* 17(2):111-113, 1974.

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

7339 THE INTESTINAL CELL SURFACE: SOME PROPERTIES OF NORMAL, UNDIFFERENTIATED, AND MALIGNANT CELLS. *(E.)* Isselbacher, K. J. (Harvard Med. Sch., Boston, Mass.). *Ann. Intern. Med.* 81(5):681-686, 1974.

See also, 7348, 7383, 7461, 7619, 7625, 7729, 7730, 7819, 7876.

ABSORPTION–EXCRETION–TRANSPORT

7340 THE INTESTINAL UNSTIRRED LAYER: ITS SURFACE AREA AND EFFECT ON ACTIVE TRANSPORT KINETICS. *(E.)* Wilson, F. A.; Dietschy, J. M. (Univ. Texas Hlth. Sci. Ctr., Dallas). *Biochim. Biophys. Acta* 363(1):112-126, 1974.

The effective surface area of the unstirred layer in the rat jejunum and ileum was calculated, along with the effect of this diffusion barrier, in relation to the active transport of several sugars, amino acids, and bile acids. The surface area varied from 1.02-14.24 cm^2/100 mg dry weight of rat intestine. These values were determined by analyzing 1) the effect of stirring on the kinetics of passive permeation and active transport into the intestinal mucosa and 2) the maximal rates of passive uptake of compounds whose rates of absorption are limited by the unstirred water layer. The values of the surface area were much lower than those found for the microvillus membrane in the jejunum (1226 cm^2/100 mg) and in the ileum (696 cm^2/100 mg). This indicated that the effective surface area of the rate-limiting membrane for such highly permeable solutes as long-chain fatty acids is from 1/100 to 1/200 of the actual anatomical surface area. The kinetics of active transport were examined for D-glucose, D-galactose, L-serine, taurocholate, and taurodeoxycholate during absorption into the ileal mucosal cell, with the thickness of the diffusion barrier being varied by altering the rate of stirring of the bulk incubation solution. The stirring appeared to have relatively little effect on the apparent maximal achievable transport rate but did significantly lower the apparent Michaelis constant for the transport carrier. The relative reduction of the apparent Michaelis constant caused by stirring was roughly proportional to the apparent value for the maximal transport rate for a particular probe molecule. Stirring decreased the apparent Michaelis constant by a factor of 3.2 for L-serine, 3.4 for D-galactose, 2.8 for D-glucose, 2.0 for taurocholate, and 1.6 for taurodeoxycholate. Hence, the presence of the unstirred layer appears to introduce major artifacts into the determination of the Michaelis constant and maximal transport rate values for the active transport process.

7341 INTESTINAL TRANSPORT OF TRITIATED FOLIC ACID (^{3}H-PGA) IN THE EVERTED GUT SAC OF DIFFERENT AGED RATS. *(E.)* Bhanthumnavin, K.; Wright, J. R.; Halsted, C. H. (NICHD Gerontol. Res. Ctr., Baltimore City Hosp., Md.). *Johns Hopkins Med. J.* 135(3):152-160, 1974.

The intestinal transport of tritiated folic acid (^{3}H-PGA) was measured in everted gut sacs prepared from male Wistar rats at ages 1.5 months, 6 months, 12 months, and 24 months to examine the possibility that decreased intestinal absorption of folate could contribute to the folate deficiency of aging. In sacs prepared from 6-week-old rats and incubated in the presence of glucose, a saturable transport system was observed, with K_t of 2.7 μM and V_{max} of 4.4 nM/g/30 min. The omission of glucose from the incubation medium resulted in deterioration of the sacs when incubated beyond 5 min. No significant change in the jejunal uptake of ^{3}H-PGA was observed in the gut sacs of the rats ranging in age from 1.5 to 24 months.

7342 INTESTINAL ABSORPTION OF D-XYLOSE AND FOLIC ACID MEASURED BY A PERFUSION TECHNIQUE IN PATAS MONKEYS (Erythrocebus patas). *(E.)* Gyr, K.; Wolf, R. H.; Felsenfeld, O. (Tulane Univ. Delta Reg. Primate Res. Ctr., Covington, La.). *Am. J. Vet. Res.* 35(11):1441-1444, 1974.

Absorption activity of the small intestine in 16 patas monkeys (*Erythrocebus patas*), 8 male and 8 female, was determined by perfusion of a 20-cm intestinal segment with fluid containing D-xylose (25 mg/ml) and folic acid (25 mg/ml). Phenol red was used as nonabsorbable marker for the correction of the dilution or concentration of the solute. Two 15-min samples of the intestinal fluid were collected after a 30-min equilibration period. An average of 15.89% D-xylose and 22.25% folic acid was absorbed. Significant correlation existed between folic acid absorption and D-xylose absorption which is consistent with reported observations that the 2 substances are absorbed in the same area; that is, mainly in the upper part of the small intestine. The results are comparable to data available from studies in man, except that less D-xylose is absorbed in the patas monkey than in man.

7343 THE EFFECT OF GLYCINE-CONJUGATED BILE ACIDS ON NET TRANSPORT AND POTENTIAL DIFFERENCE ACROSS ISOLATED RAT JEJUNUM AND ILEUM. *(E.)* Wingate, D. L. (London Hosp. Med. Coll., England). *J. Physiol. (Lond.)* 242(1):189-207, 1974.

The effects of conjugated bile acids on net transport across *in vitro* jejunum and ileum segments from male Sprague-Dawley rats were compared in an attempt to determine if the inhibition of absorption might be reproducible *in vitro*. Five mM glycodeoxycholate and glycochenodeoxycholate inhibited net fluid transport across isolated rat jejunum and ileum. Five mM glycocholate did not affect jejunal segments, but did arrest fluid transport across ileal segments. Inhibition of fluid transport was accompanied by some diminution of mucosal glucose uptake, but translocation of glucose to the serosal surface of jejunal segments persisted in the presence of dihydroxy conjugated bile acids. Inhibition of fluid transport was accompanied by a marked fall in the glucose-stimulated transmural electropotential difference, within 5 min of mucosal exposure to the bile acids. The results suggest that inhibition of intestinal fluid transport is reproducible *in vitro*, and that the inhibition is not associated with increased permeability of the mucosa, but may be associated with altered permeability of the mucosal pole of the enterocyte.

7344 METHIONINE ACCUMULATION IN VILLI ISOLATED FROM MATURING RAT INTESTINE.

(E.) Fondacaro, J. D.; Nathan, P.; Wright, W. E. (Univ. Cincinnati Coll. Med., Ohio). *J. Physiol. (Lond.)* 241(3):751-760, 1974.

The absorption of methionine by mucosal cells of the rat small intestine was characterized and compared with the absorption patterns in different areas of the small intestine from 15- and 30-day-old Wistar rats, preweaned and postweaned, resp., using a new *in vitro* method, the villus technique. This technique permits the evaluation of the mucosal absorptive cells separated from the relatively non-transporting muscle and connective tissue components. Mucosal cells incubated in methionine below 1.0 mM concentration had about the same transport capacity in preweaned and postweaned rats. Although this observation was true for both the duodenum and jejunum, there was significantly greater methionine transport in the ileum from preweaned than from postweaned rats at initial concentrations below 1.0 mM. With initial methionine concentration greater than 1.0 mM, duodenal and jejunal villi from preweaned animals transported methionine better than villi from older animals. With increasing initial concentration of methionine, unknown physiological changes occurred during maturation due to slower transport rates into villi of mature duodenal and jejunal tissues than into similar tissue from preweaned rats. The results indicate that the absorbing mucosal cells from the duodenum, jejunum and ileum have an equal capacity for methionine accumulation following maturation.

7345 REGIONAL DIFFERENCES IN COMPARTMENTAL DISTRIBUTION OF PALMITATE IN INTESTINE.

(E.) Mishkin, S.; Wener, R.; Yalovsky, M.; Kessler, J. I. (McGill Univ. Clin., Montreal, Canada). *Am. J. Physiol.* 227(4):771-777, 1974.

The uptake and compartmental distribution of micellar palmitic acid by different regions of hamster small intestine were investigated by incubating paired everted sacs of female golden hamsters (each small intestine was divided into 9 segments, 3 cm in length). The incubation time was 10 min at 37 C under 95% O_2-5% CO_2, in 10 ml of micellar incubation medium that contained 10 μM [1-^{14}C] palmitic acid (0.05 C/μM), 10 μM monoolein, 100 μM taurodeoxycholate, and 100 μM glucose made up in 0.15 M Krebs-Ringer buffer. Subsequently, the sacs underwent serial rinsing in ice-cold Krebs-Ringer buffer and 2.5% albumin. Uptake of radiopalmitate by the proximal segments was greater, but the distal segments released a larger proportion of the radiopalmitate uptake into Krebs-Ringer buffer and into albumin. While the proportion of radiopalmitate in the free fatty acid fraction of the tissue after rinsing remained quite constant regardless of location, the radioactivity in the esterified fatty acid fraction of the proximal segment was 5-fold greater. The fraction of the uptake released by rinsing was inversely related to the fraction of esterified radiopalmitate. The marked regional differences in compartmental distribution of radiopalmitate could be entirely accounted for by differences in esterification.

7346 GLUCOSE ACCUMULATION BY RAT SMALL INTESTINE DURING ABSORPTION IN VIVO.

(E.) Leese, H. (Dept. Biol., Univ. York, Heslington, England). *Nature (Lond.)* 251(5475):512-513, 1974.

The accumulation of glucose to give a small intestinal tissue concentration higher than that in the bathing fluid has been observed in a wide variety of *in vitro* preparations; here, it is extended to an *in vivo* situation. About 20 cm of jejunum from male Wistar rats under ether anesthesia was exposed, and the lumen rinsed with 10 ml ice cold 0.9% NaCl. The segment was cannulated, and the lumen perfused *in situ* with Krebs-Ringer bicarbonate medium. During perfusion, the gut was replaced inside the body wall, and the animal maintained continuously under ether. After 5 min perfusion, glucose was added to the luminal circuit, and the perfusion continued for a further 10 min. When the initial concentration of glucose in the lumen was 5.55 mM, there was an approximately 2-fold uphill gradient of glucose from lumen to plasma. In this situation, the gut wall concentrated the glucose to a level almost 1.5 times that in the plasma, and over 3 times that in the lumen, so that a downhill movement of glucose could take place from the tissue into the blood. In the complete absence of glucose in the lumen, and in the presence of phlorizin, a substantial amount of glucose was present in the gut wall, probably in the mucosa. This may be explained by a backward movement of glucose from the plasma to the epithelial cells. The results suggest that gut glucose concentrations during absorption are influenced more by the concentration of sugar in the plasma rather than that in the lumen.

7347 INHIBITION OF ACTIVE TRANSPORT BY OUABAIN IN THE CANINE STOMACH.

(E.) Kuo, Y. M.; Bowen, J. C.; Smith, J. W.; Sernka, T. J.; Jacobson, E. D.; Shanbour, L. L. (Univ. Texas Med. Sch., Houston). *Proc. Soc. Exp. Biol. Med.* 147(1):144-147, 1974.

The effects of ouabain on active transport and the electrical properties of an *in vivo* canine stomach preparation in 6 fasted mongrel dogs were explored and the findings compared with flux measurements in an *in vitro* canine stomach preparation in 12 dogs. Ouabain (50 μg/kg) decreased the potential difference (PD) of histamine-stimulated canine gastric mucosa *in vivo*. Calculated electrical resistance (PD/I) was not decreased, and the rate of acid secretion was unaltered by ouabain. These findings support the inference that ouabain inhibits active chloride transport to diminish PD. This inference was verified by the *in vitro* experiments in which ouabain inhibited the net flux of chloride in the acid-bathed mucosal segment.

7348 EFFECTS OF VITAMIN D_3 ON DUODENAL ABSORPTIVE CELLS OF CHICKS. AN ELECTRON MICROSCOPIC STUDY.

(E.) Jande, S. S.; Brewer, L. M. (Fac. Med., Univ. Ottawa, Ontario, Canada). *Z. Anat. Entwicklungsgesch.* 144(3):249-265, 1974.

Duodenal epithelial cells of 30 White Leghorn chicks were studied at the electron microscopic level to determine the effects of vitamin D on the cells directly involved in calcium absorption in the time scale of its known biochemical and physiological effects. The chicks were placed on a rachitogenic test diet 2 days after hatching. After 4 weeks, 1/2 the chicks were injected i.m. with 500 IU of vitamin D_3. Three chicks of similar age, raised on a normal diet, were used as controls. The depletion of vitamin D led to a decrease in the length of microvilli of the brush border, in the number of apical pits and vesicles, in the size of the Golgi complex, the amount of rough endoplasmic reticulum and in the relative number of secondary lysosomes, while the repletion of vitamin D caused a subsequent increase. Previously described physiological effects of vitamin D on calcium absorption, when coupled with these new morphological observations, suggest a possible mechanism for calcium absorption by the duodenal cells.

7349 INCREASED PHENOLSULFONPHTHALEIN ABSORPTION FOLLOWING DISRUPTION OF THE GASTRIC MUCOSAL BARRIER BY UREA.

(E.) Bowen, J. C.; Fischer, R. P.; Ritchie, Jr., W. P. (Walter Reed Army Inst. Res., Washington, D.C.). *Proc. Soc. Exp. Biol. Med.* 147(1): 280-283, 1974.

The absorption of phenolsulfonphthalein (PSP) in canine Heidenhain pouches before and after the topical application of 4 M urea was determined. Associated changes in the net fluxes of H_2O, H^+, K^+, and Cl^- and the net and bidirectional fluxes of Na^+ were also assayed to document disruption of the mucosal barrier. PSP absorption before urea instillation averaged 0.13 μM/30 min/100 cm^2 mucosal area. Following urea, an average of 0.63 μM/30 min/100 cm^2 mucosal area was absorbed. Associated ionic and water flux rates demonstrated significantly increased back diffusion of H^+ and influx of Na^+, K^+, and water into the lumen. The observation of over a 4-fold increase in PSP absorption after urea instillation indicated that mucosal permeability was increased; increased effective pore area may be responsible. It was also suggested that this observation provides evidence that the observed alterations in ionic fluxes are, in fact, the result of altered mucosal permeability. It was concluded that PSP should not be used as a volume marker in studies in which the integrity of the gastric mucosal barrier is altered.

7350 COMPUTER MODELING OF NONSTEADY STATE SODIUM KINETICS IN LIVER.

(E.) Smith, G. A.; Llaurado, J. G. (Med. Coll. Wisconsin, Milwaukee). *IEEE Trans. Biomed. Eng.* 21(6):433-443, 1974.

A procedure for constructing a computer model of nonsteady state sodium kinetics in liver was based on obtaining 1) continuous tracer outflow records from liver fragments *in vivo* of male white rats injected i.p. with 1 mC ^{24}Na, and 2) an independent tracee (the material of interest) prototype record by flame photometry from liver fragments incubated in a Krebs medium at 37 C, in the course of a comparable *in vitro* period. In the computer modeling procedure, 1st, a 2 compartment model with time varying parameter characteristics was built with the aid of the SAAM computer program; and 2nd, the approach was extended to a symmetric linked juxtaposition of 2 systems, 1 for tracer and 1 for tracee, each consisting of 3 compartments. From the transport rate constants obtained, Na relative compartment sizes and percent of extracellular (EC) fluid volume were calculated. Results for the 3 compartment model, qualitatively consistent with published physiological details, are in agreement with previously reported data. Significantly, the values found for the Na transport rate constants, Na relative compartment sizes and percent of EC fluid volume are not affected by fluctuations intrinsic to auxiliary indicators of EC space, but are based solely on measurements of Na.

7351 CATION TRANSPORT IN THE LIVER IN HEMORRHAGIC SHOCK.

(E.) Sayeed, M. M.; Wurth, M. A.; Chaudry, I. H.; Baue, A. E. (Washington Univ. Sch. Med., St. Louis, Mo.). *Circ. Shock* 1(3):195-208, 1974.

Cation transport capability was measured in liver slices of male Holtzman rats bled to mean arterial blood pressure of 40 mm Hg. This pressure was maintained for 1/2, 1, or 2 hr to reproduce conditions of early, intermediate, and late shock, resp. *In vitro* sodium-potassium transport was inhibited in early, intermediate, and late shock and was accompanied by a loss of cell volume regulation. Sodium and water contents increased and tissue adenosine nucleotides decreased with shock. The decreases in ATP, ATP:ADP ratio, and the energy charge values in intermediate and in late shock probably were not of such a magnitude to indicate complete loss of the *in vitro* sodium-potassium transport. The impairment of cation transport with shock can thus be related to a factor other than energy availability. *In vitro* cation transport was restored to normal with reinfusion of all shed blood and Ringer's lactate in early shock but not in intermediate shock.

7352 UPTAKE AND TRANSPORT OF MACROMOLECULES BY THE INTESTINE. POSSIBLE ROLE IN CLINICAL DISORDERS.

(E.) Walker, W.A.; Isselbacher, K. J. (Harvard Med. Sch., Boston, Mass.). *Gastroenterology* 67(3):531-550, 1974.

7353 IONIC PERMEABILITY OF CANINE ANTRUM. *(E.)* Altamirano, M.; Cruz, L. (Med. Sch., Univ. Central Venezuela, Caracas). *Am. J. Physiol.* 227(2):256-263, 1974.

7354 EFFECT OF ETHANOL, ACETYLSALICYLIC ACID, ACETAMINOPHEN, AND FERROUS SULFATE ON GASTRIC MUCOSAL PERMEABILITY IN MAN. *(E.)* Gordon, M. J.; Skillman, J. J.; Edwards, B. G.; Silen, W. (Harvard Med. Sch., Boston, Mass.). *Surgery* 76(3): 405-412, 1974.

7355 MAGNESIUM ABSORPTION BY THE RAT ILEUM AND COLON. *(E.)* Behar, J. (VA Hosp., West Haven, Conn.). *Am. J. Physiol.* 227(2):334-340, 1974.

7356 THE ABSORPTION, DISTRIBUTION AND EXCRETION OF LINALOOL IN THE RAT. *(E.)* Parke, D. V.; Quddusur Rahman, K. M.; Walker, R. (Dept. Biochem., Univ. Surrey, Guildford, England). *Biochem. Soc. Trans.* 2(4):612-615, 1974.

7357 SOME ASPECTS OF THE METABOLISM OF DIMETHYLNITROSAMINE IN THE RAT. *(E.)* Heading, C. E.; Phillips, J. C.; Lake, B. G.; Gangolli, S. D.; Lloyd, A. G. (British Ind. Biol. Res. Assoc., Carshalton, England). *Biochem. Soc. Trans.* 2(4): 607-610, 1974.

7358 BARIUM AND K^+ ON SURFACE AND TUBULAR CELL RESISTANCES OF FROG STOMACH WITH MICROELECTRODES. *(E.)* O'Callaghan, J.; Sanders, S. S.; Shoemaker, R. L.; Rehm, W. S. (Univ. Alabama Med. Ctr., Birmingham). *Am. J. Physiol.* 227(2):273-288, 1974.

7359 ANION PERMEABILITY IN THE RABBIT GALLBLADDER. *(It.)* Cremaschi, D.; Henin, S. (Inst. Gen. Physiol., Univ. Milan, Italy). *Boll. Soc. Ital. Biol. Sper.* 49(18 bis):no. 63, 1973.

7360 SPECIES DIFFERENCES IN IN VIVO ABSORPTION OF D-GLUCOSE IN THE INTESTINE. *(It.)* Eposito, G.; Faelli, A.; Capraro, V. (Inst. Gen. Physiol., Univ. Milan, Italy). *Boll. Soc. Ital. Sper.* 49(18 bis):no. 61, 1973.

7361 ATPases AND IN VIVO AND IN VITRO TRANSPORT ACROSS THE INTESTINE. *(It.)* Faelli, A.; Esposito, G.; Simonetta, M.; Capraro, V. (Inst. Gen. Physiol., Univ. Milan, Italy). *Boll. Soc. Ital. Biol. Sper.* 49(18 bis):no. 60, 1973.

7362 A MODEL FOR IN VITRO TRANSPORT OF L- AND D-HISTIDINE IN THE RAT SMALL INTESTINE. *(It.)* Ceriani, T.; Marcioni, A.; Rindi, G.; Schmid, R.; Stefanelli, M.; Ventura, U. (Inst. Hum. Physiol., Univ. Pavia, Italy). *Boll. Soc. Ital. Sper.* 49(18 bis):no. 75, 1973.

See also, 7339, 7366, 7418, 7486, 7517, 7518, 7519, 7632, 8102.

MOTILITY

7363 ACUTE EXPERIMENTS ON NEUROEFFECTOR FUNCTION IN CANINE ESOPHAGEAL ACHALASIA. *(E.)* Gray, G. W. (Coll. Vet. Med., Univ. Minnesota, St. Paul). *Am. J. Vet. Res.* 35(8):1075-1081, 1974.

Acute experiments were performed on 5 normal dogs and 3 dogs with spontaneous achalasia, defined as megaesophagus with esophageal retention of ingested material and with intermittent regurgitation. Regardless of the voltage and frequency of cervical vagal stimulation *in vivo*, far weaker intraesophageal pressure responses were produced in dogs with achalasia than in controls. The major esophageal motor responses were the twitch and tetanic type characteristic of striated muscle. An additional slow motor response was present and prominent in the thoracic part of the esophagus of dogs with achalasia; this may have been due to smooth muscle contraction. The thoracic cavity was opened to permit direct visualization of esophageal response to maximal vagal stimulation. Dogs with achalasia responded only with isolated concentric rings of weak contraction, while controls showed marked tetanic contraction of the entire esophagus. *In vitro* studies were performed on 2 nerve-muscle preparations from the thoracic esophagus of each dog. These results support the view that the twitch and tetanic responses observed both *in vivo* and *in vitro* are due to striated muscle contraction, while transient slow and sustained contractions induced by acetylcholine (10^{-7} to 10^{-5} g/ml) *in vitro* and by vagal stimulation *in vivo* are due to smooth muscle in the esophageal wall. Since vagal influence on the heart rate was abnormal and/or deficient in all dogs with achalasia, it is suggested that the esophageal contractile defect in these dogs is neural, rather than muscular, in nature.

7364 THE RELATIVE SIGNIFICANCE OF ELECTRICAL SPIKE POTENTIALS AND INTRALUMINAL PRESSURE WAVES AS QUANTITATIVE INDICATORS OF MOTILITY. *(E.)* Oigaard, A.; Dorph, S. (Rigshosp. Copenhagen, Denmark). *Am. J. Dig. Dis.* 19(9):797-803, 1974.

The relative significance of electrical spike potentials and intraluminal pressure waves as quantitative indicators of motility was studied from 60 recordings of the intestine of normal volunteers and patients. Short sequences (20-50 sec) of synchronized cinefluorography were used to correlate the pressure and spike potential parameters with visible intestinal activity. Spike potentials corresponding to pressure waves of low amplitude and short duration nearly always started before the onset of the pressure wave, with the interval ranging from less than 1 sec to a maximum of 2 sec. The onset of pressure waves of greater amplitude and longer duration most often preceded the onset of the corresponding spike potential. For larger, complex pressure waves the tendency was even more marked, with a maximum interval of 12 sec. No corresponding pressure wave was observed for 20% of the spike potentials, though spike potentials of more than 3 sec pulse duration and greater than 370 microvolts in amplitude always had a pressure correlate. Pressure waves without a corresponding spike potential occurred in 3% of the recordings. Computer correlations for 1000 corresponding pairs of spike potentials and pressures in terms of all possible combinations of amplitude and duration were statistically significant. Combinations that included amplitude of spike potentials, however, showed a correlation coefficient below 0.33 in contrast to all other combinations ranging between 0.6 and 0.8. Spike potential duration correlated reasonably well with the degree of visible activity, though the spike amplitude showed a great range in variation. A fair correlation was also found between the degree of visible activity and pressure wave characteristics. Spike potentials without corresponding pressure waves apparently represented weak muscular activity which was not reflected in the intraluminal pressure. Pressure waves without an electrical counterpart probably reflected activity in adjacent bowel segments.

7365 EFFECTS OF PENTAGASTRIN ON ELECTRICAL ACTIVITY OF SMALL INTESTINE OF THE DOG.

(E.) Weisbrodt, N. W.; Copeland, E. M.; Kearley, R. W.; Moore, E. P.; Johnson, L. R. (Univ. Texas Med. Sch., Houston). *Am. J. Physiol.* 227(2):425-429, 1974.

The effect of pentagastrin on the myoelectric activity of the small intestine was determined in 3 conscious dogs (1 male and 2 female). The animals were implanted with electrodes spaced 25 cm apart along the entire length of the small intestine, and a cannula was placed in the most dependent portion of the stomach. Recordings were made with dogs in the fasted and fed states and during infusion of pentagastrin in doses of 1 or 2 μg/kg/hr. In the fasted periods and during pentagastrin infusion, the cannula was open to divert gastric secretions from the duodenum. Two distinct patterns of myoelectric activity were recorded: one typical of the fasted state (the interdigestive myoelectric complex) and one typical of the fed state. Infusion of pentagastrin into the fasted animals changed the pattern of myoelectric activity from that of a fasted condition to that of a fed condition, indicating that the change in small intestinal myoelectric activity caused by the ingestion of food may in part be due to the release and action of gastrin. The fact that the spike potential pattern induced by pentagastrin was not as regular as in the fed state indicated that there were probably factors in addition to gastrin which were responsible for the conversion of the fasted to the fed state.

7366 INTESTINAL TRANSMURAL ELECTRICAL PROPERTIES: EFFECTS OF CONJUGATED BILE SALT IN VITRO.

(E.) Wall, M. J.; Baker, R. D. (Med. Coll. Wisconsin, Milwaukee). *Am. J. Physiol.* 227(2):499-506, 1974.

The effects of conjugated bile salt on the *in vitro* transmural electrical properties of flat sheets of rat small intestine were studied by monitoring the transmural electrical potential difference, short-circuit current (expressed as the voltage drop across a 100 ohm resistor in series with the intestine), and areal specific resistance before and after the addition of taurocholate to the incubation medium. Segments of intestine were excised from either the upper jejunum (just below the ligament of Treitz) or terminal ileum and placed in Krebs-Henseleit bicarbonate solution. An abrupt increase in transmural potential difference and short-circuit current occurred in terminal ileal sheets immediately upon exposure to 10 mM taurocholate; no effect was observed in the upper jejunal sheets. Areal specific resistance was reduced by taurocholate in both ileal and jejunal preparations. The effect of the bile salt on transmural potential difference and short-circuit current depended on oxidative metabolism, whereas the effect on areal specific resistance did not. Unidirectional influx of taurocholate into ileal epithelium was also found to require oxidative metabolism. Short-circuit current and areal specific resistance effects were maximal at a taurocholate concentration of 5 mM, and the critical micellar concentration for taurocholate was about 6 mM for the experimental conditions. The electrical effects observed thus appeared to be caused by bile salt monomers and not by micelles. The hypothesis that active transport of taurocholate and electrogenicity are mediated by a common set of receptors are not supported by the data. Concentration dependency of electrogenicity differs from that for unidirectional influx of taurocholate into ileal epithelium.

7367 QUANTITATIVE ANALYSIS OF MOTILITY RECORDING IN THE HUMAN SMALL INTESTINE. *(E.)*

Oigaard, A.; Dorph, S. (Rigshosp., Copenhagen, Denmark). *Am. J. Dig. Dis.* 19(9):804-810, 1974.

Simultaneous measurements of intraluminal pressure and electrical-action potentials (spike potentials) in the human duodenum were recorded for 100 persons (patients without upper gastrointestinal-tract diseases and normal volunteers). Motor-active drugs (pyridostigmine bromide or metoclopramide) were administered i.v. after a fasting period of 20 min, and recording was continued for another 20-30 min. Consecutive 50-sec periods (corresponding to one page of graph paper) of combined pressure and electrical tracings were classified in a stepwise scale of increasing activity according to the frequency of spike potentials in combination with frequency, duration, and amplitude of the corresponding pressure waves. Synchronized cinefluorography was used to correlate the tracing with visible intestinal activity. The duration of spike potentials appeared to correlate well with the duration and amplitude of pressure waves. At high levels of intestinal contraction, pressure was found to be more informative. Vigorous contractions associated with gross segmentation or propulsion were almost always observed during pressure elevations of medium or maximum size, while corresponding spike potentials did not necessarily indicate a high level of activity. Spike potentials observed in the absence of pressure waves and probably representing weak contractions in a small segment of the circular muscle coat of the small intestine appeared to confirm the greater sensitivity of the electrical parameter for motility measurements. A combination of the pressure and electrical parameters is proposed for clinical motility studies.

7368 RECORDING OF ELECTRICAL ACTIVITY OF SMOOTH MUSCLE BY MEANS OF THE SUCROSE GAP. *(E.)* Szurszewski, J. H. (Mayo Med. Sch., Rochester, Minn.). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 409-425.

7369 THE ROLE OF HORMONES IN REGULATION OF GASTROINTESTINAL MOTILITY. *(E.)* Grossman, M. I. (VA Hosp., Los Angeles, Calif.). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 217-222.

7370 NEURAL AND HUMORAL CONTROL OF THE INTERDIGESTIVE MYOELECTRIC COMPLEX. *(E.)* Marik, F.; Code, C. F. (Mayo Clin., Rochester, Minn.). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* p. 657.

7371 DIVERSITY OF ELECTRICAL ACTIVITY IN GASTROINTESTINAL MUSCLES. *(E.)* Prosser, C. L. (Dept. Physiol., Univ. Illinois, Urbana) *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 21-37.

7372 USE OF MAGNESIUM FERRITE AS REFERENCE SUBSTANCE TO MEASURE PASSAGE OF FOOD IN THE GASTROINTESTINAL TRACT OF RUMINANTS. *(E.)* Yerushalmi, S.; Neumark, H. (Weizmann Inst. Sci., Rehovot, Israel). *IEEE Trans. Magnetics* 10(3):958-960, 1974.

7373 MANOMETRIC METHODS FOR MEASURING RAPID PRESSURE CHANGES IN THE ESOPHAGUS AND ITS SPHINCTERS. *(E.)* Waldeck, F.; Jennewein, H. M.; Siewert, R. (C. H. Boehringer Sohn, Ingelheim, Rhein, Germany). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 449-456.

7374 EVALUATION OF ESOPHAGEAL MOVEMENT USING INTRAMURAL TANTALUM WIRE MARKERS. *(E.)* Dodds, W. J.; Stewart, E. T. (Med. Coll. Wisconsin, Milwaukee). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 313-322.

7375 STUDIES ON THE ORIGIN OF THE DISTINCTIVE MECHANICS OF SMOOTH MUSCLE AT THE ESOPHAGOGASTRIC JUNCTION. *(E.)* Christensen, J.; Conklin, J. L. (Univ. Iowa Coll. Med., Iowa City). *Proc. Int. Symp. Gastrointest.Motility, 4th, 1973* pp. 63-71.

7376 LOWER ESOPHAGEAL SPHINCTER RESPONSE TO CHOLINERGIC STIMULATION: GASTRIN RELATED BY [SIC!] NOT GASTRIN RELEASING. *(E.)* Higgs, R. H.; Castell, D. O.; McGuigan, J. E. (U.S. Naval Hosp., Philadelphia, Pa.). *Physiologist* 17(3):247, 1974.

7377 CENTRAL CONTROL OF DEGLUTITION AND OESOPHAGEAL PERISTALSIS. *(E.)* Roman, C. (Lab. Gen. Neurophysiol., Univ. Provence, Ctr. St. Jerome, Marseille, France). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 647-648.

7378 THE INOTROPIC ACTION OF GASTRIN. *(E.)* Cohen, S. (Dept. Med., Univ. Pennsylvania, Philadelphia). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 225-232.

7379 PROSTAGLANDINS AND THE CARDIAC SPHINCTER IN MAN. *(E.)* Dilawari, J. B.; Newman, A.; Polco, J.; Misiewicz, J. J. (Central Middlesex Hosp., London, England). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 281-286.

7380 EFFECT OF PROSTAGLANDIN E_1 ON RESTING GASTROESOPHAGEAL SPHINCTER PRESSURE IN NORMAL HUMAN SUBJECTS. *(E.)* Sorensen, H. R.; Boesby, S.; Pedersen, S. A. (Odense Univ. Hosp., Denmark). *Acta Pharmacol. Toxicol.* [*suppl.*]*(Kbh.)* 35:86, 1974.

7381 THE EFFECT OF THE GASTRO-INTESTINAL POLYPEPTIDE HORMONES ON THE ELECTRICAL ACTIVITY AND PRESSURE OF THE ISOLATED PERFUSED CANINE GASTRO-OESOPHAGEAL SPHINCTER. *(E.)* Thomas, P. A.; Earlam, R. J. (London Hosp., England). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 243-250.

7382 CANINE GASTRIC MOTILITY AND EMPTYING: ELECTRIC, NEURAL, AND HORMONAL CONTROLS. *(E.)* Kelly, K. A. (Mayo Clin., Rochester, Minn.). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 463-470.

7383 ULTRASTRUCTURAL BASIS FOR ELECTRICAL COUPLING IN THE DOG STOMACH. *(E.)* Oki, M.; Daniel, E. E. (Dept. Pharmacol., Univ. Alberta, Edmonton, Canada). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 85-95.

7384 ELECTRICAL AND MECHANICAL ACTIVITY RECORDED FROM THE ISOLATED, PERFUSED CANINE STOMACH: THE EFFECTS OF SOME G.I. POLYPEPTIDES. *(E.)* Cook, M. A.; Kowalewski, K.; Daniel, E. E. (Surg.-Med. Res. Inst., Univ. Alberta, Edmonton, Canada). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 233-242.

7385 A SIMPLE ANIMAL PREPARATION TO STUDY THE EFFECT OF GASTROINTESTINAL HORMONES AND RELATED PEPTIDES ON PYLORIC FUNCTION. *(E.)* Halter, F.; Fluckiger, J.; Schilt, V. (Dept. Med., Univ. Berne, Switzerland). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 251-258.

7386 THE EFFECTS OF CHOLECYSTOKININ (CCK) ON THE CANINE GASTROINTESTINAL (GI) TRACT AT DIFFERENT PHASES OF THE INTERDIGESTIVE MYOELECTRIC COMPLEX (IDMEC). *(E.)* Tan, L.; Code, C. F. (Mayo Fdn., Rochester, Minn.). *Physiologist* 17(3):341, 1974.

7387 THE EFFECTS OF DUODENAL ACIDIFICATION UPON GASTRIC MYOELECTRICAL ACTIVITY IN MAN; EVIDENCE FOR A ROLE OF ENDOGENOUS SECRETIN. *(E.)* Couturier, D.; Roze, C.; Debray, C. (Hosp. Bichat, Paris, France). *Proc. Int. Symp. Gastrointest. Motility, 4th 1973* pp. 259-269.

7388 THE EFFECTS OF LIQUID TEST MEALS AND DRUGS ON CANINE ANTRAL-DUODENAL CONTRACTILE ACTIVITY FOLLOWING PARIETAL CELL OR TRUNCAL VAGOTOMY WITH OR WITHOUT PYLOROPLASTY. *(E.)* Ormsbee, III., H. S.; Springfield, A. C.; Weddle, II, C. O.; Bass, P. (Sch. Pharm., Univ. Wisconsin, Madison). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp.555-569.

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7390 A TECHNIQUE FOR LONG-TERM STUDIES OF THE ELECTRICAL ACTIVITY OF THE GUT IN THE FOETUS AND NEONATE. *(E.)* Ruckebusch, Y.; Grivel, M. L. (Vet. Sch., Toulouse, France). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 427-434.

7391 AN ELECTROPHYSIOLOGICAL INVESTIGATION OF THE SLOW WAVE MECHANISM IN CAT INTESTINAL MUSCLE. *(E.)* Weems, W. A. (Univ. Illinois, Urbana-Champaign). *Diss. Abs. Int. B* 34(12):6185, 1974.

7392 THE IONIC BASIS OF INTESTINAL CONTROL POTENTIALS (SLOW WAVES). *(E.)* El Sharkawy, T. Y.; Daniel, E. E. (Dept. Pharmacol., Univ. Alberta, Edmonton, Canada). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 39-52.

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7394 MYOGENIC CONTROL OF INTESTINAL PERISTALSIS. *(E.)* Bortoff, A.; Sacco, J. (Upstate Med. Ctr., State Univ. New York, Syracuse). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 53-60.

7395 CENTRAL NERVOUS CONTROL OF INTESTINAL MOTILITY. *(E.)* Weisbrodt, N. W.; Burks, T. F. (Univ. Texas Med. Sch., Houston). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 649-656.

7396 ELECTRICAL CONTROL MECHANISMS AT THE ILEOCOLIC JUNCTION. *(E.)* Wienbeck, M.; Janssen, H. (Dept. Intern. Med., Univ. Marburg, Germany). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 97-107.

7397 THE INTRINSIC INNERVATION OF HUMAN SIGMOID COLONIC MUSCLE. *(E.)* Stockley, H. L.; Bennett, A. (King's Coll. Hosp., London, England). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 165-176.

7398 THE INNERVATION OF THE INTERNAL ANAL SPHINCTER OF THE GUINEA-PIG. *(E.)* Costa, M.; Furness, J. B. (Dept. Zool., Univ. Melbourne, Parkville, Australia). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 681-690.

7399 RELEASE OF ACETYLCHOLINE FROM THE MYENTERIC PLEXUS OF THE GUINEA-PIG ILEUM. *(E.)* Waterfield, A. A.; Kosterlitz, H. W. (Dept. Pharmacol., Univ. Aberdeen, Scotland). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 659-666.

7400 INTRACELLULAR RECORDINGS FROM NEURONES LYING IN THE MYENTERIC PLEXUS OF GUINEA PIG SMALL INTESTINE. *(E.)* Hirst, G. D. S.; Holman, M. E.; McKirdy, H. C. (Dept. Physiol., Monash Univ., Clayton, Victoria, Australia). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 677-679.

7401 PROPERTIES OF THE GANGLION CELLS OF THE MYENTERIC PLEXUS OF THE GUINEA-PIG ILEUM DETERMINED BY INTRACELLULAR RECORDING. *(E.)* North, R. A.; Nishi, S. (Dept. Pharmacol., Univ. Aberdeen, Scotland). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 667-676.

7402 ACTION OF COHERIN ON THE BASIC ELECTRICAL RHYTHM AND PROPAGATION IN THE ISOLATED PERFUSED CANINE JEJUNUM. *(E.)* Hiatt, R. B.; Grenier, J.; Mendel, C.; Goodman, I. (Coll Physicians Surgeons, Columbia Univ., New York). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 63-71.

7403 EFFECTS OF NICOTINIC AGENTS ON REBOUND EXCITATION OF GUINEA-PIG SMALL INTESTINE. *(E.)* Wood, J. D.; Rose, B. A. (Univ. Kansas Med. Ctr., Kansas City). *Physiologist* 17(3):362, 1974.

7404 MOTOR AND SECRETORY RESPONSES OF THE HUMAN SMALL INTESTINE TO CIRCULATING PROSTALANDIN $F_{2\alpha}$. *(E.)* Milton-Thompson, G. J.; Billings, J. A.; Cummings, J. H.; Newman, A.; Misiewicz, J. J. (Roy. Naval Hosp., London, England). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 271-280.

7405 α-1-ACETYLMETHADOL AND ITS N-DEMETHYLATED METABOLITES HAVE POTENT OPIATE ACTION IN THE GUINEA PIG ISOLATED ILEUM. *(E.)* Nickander, R.; Booher, R.; Miles, H. (Lilly Res. Lab., Indianapolis, Ind.). *Life Sci.* 14(10):2011-2017, 1974.

7406 BILIARY-DUODENAL DYNAMICS IN MAN—CINERADIOGRAPHIC AND MANOMETRIC STUDIES FOLLOWING ADMINISTRATION OF DRUGS AND HORMONES. *(E.)* Salik, J. O.; Siegel, C. I.; Mendeloff, A. I. (Sinai Hosp., Baltimore, Md.). *Invest. Radiol.* 9(3):206-209, 1974.

7407 ACTION OF SOME NATURAL AND SYNTHETIC PEPTIDES ON THE MOTILITY OF HUMAN GASTROINTESTINAL TRACT IN VITRO. *(E.)* Bertaccini, G.; Impicciatore, M.; Molina, E.; Zappia, L. (Dept. Pharmacol., Univ. Parma, Italy). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 281-292.

7408 EFFECTS OF BOMBESIN ON GALLBLADDER AND DUODENO-JEJUNAL MECHANICAL ACTIVITY IN MAN. *(E.)* Corazziari, E.; Delle Fave, G. F.; Melchiorri, P.; Torsoli, A. (Second Med. Clin., Univ. Rome, Italy). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 293-299.

7409 EFFECTS OF BOMBESIN AND BOMBESIN-LIKE PEPTIDES ON GASTROINTESTINAL MYO-ELECTRIC ACTIVITY. *(E.)* Caprilli, R.; Frieri, G.; Improta, G.; Melchiorri, P.; Vernia, P. (2nd Med. Clin., Univ. Rome, Italy). *Br. J. Pharmacol.* 52(3):465P-466P, 1974.

7410 CHANGES IN JEJUNAL MOTILITY IN RESPONSE TO NATURAL EMOTIONAL STIMULI. *(It.)* Granata, L.; Leone, D.; Paccione, F.; Ruccia, D. (Inst. Hum. Physiol., Univ. Bari, Italy). *Boll. Soc. Ital. Biol. Sper.* 49(18 bis):no. 47, 1973.

See also, 7412, 7595, 7627, 7633, 7699, 7700, 7701,
7717, 7720, 7724, 7761, 7770, 7785, 7791,
7793, 7821, 7854, 7863, 7874, 7875.

SECRETION AND METABOLISM

7411 EFFECT OF GIP AND VIP ON GASTRIN RELEASE AND GASTRIC SECRETION. *(E.)* Rayford, P. L.; Villar, H. V.; Reeder, D. D.; Thompson, J. C. (Univ. Texas Med. Br., Galveston). *Physiologist* 17(3):319, 1974.

7412 EFFECTS OF BOMBESIN (BBS) ON GASTRINOEMIA, GASTRIC, PANCREATIC AND BILIARY SECRETION AND ON GALLBLADDER MOTOR ACTIVITY IN DOG. *(E.)* Erspamer, V.; Melchiorri, P.; Sopranzi, N. (Inst. Pharmacol., Univ. Rome, Italy). *Rend. Gastroenterol.* 5(3):240a-240b, 1973.

7413 DEVELOPMENT AND CONTROL OF INTESTINAL AND HEPATIC FRUCTOKINASE. *(E.)* Grand, R. J.; Schay, M. I.; Jaksina, S. (Harvard Med. Sch., Boston, Mass.). *Pediatr. Res.* 8(8):765-770, 1974.

See also, 7369, 7381, 7385, 7386.

SECRETION AND METABOLISM

Stomach

7414 NEONATAL SECRETION OF GASTRIN AND GLUCAGON. *(E.)* Rogers, I. M.; Davidson, D. C.; Lawrence, J.; Ardill, J.; Buchanan, K. D. (Stobhill Hosp., Glasgow, Scotland). *Arch. Dis. Child.* 49(10):796-801, 1974.

Plasma gastrin and glucagon levels were estimated in mothers after labor, and in their babies at birth and on the 4th day of life. The newly born baby appears to secrete gastrin independently and the plasma levels are higher on the 4th day of life. The cord gastrin level is lower when labor is induced or augmented by the i.v. infusion of oxytocin. These results do not exclude the possibility that gastrin is transferred from mother to baby during a spontaneous labor. Such a maternal component of cord gastrin may be responsible for neonatal gastric hyperacidity. The mean cord glucagon level is higher than the maternal level at birth and the 4th day level is higher than the cord level. The C-terminal reactive glucagon-like immunoreactivity in the cord blood is lower when oxytocin has been used during labor. Maternal or placental transfer of C-terminal reactive glucagon-like immunoreactivity during labor to the spontaneously born baby is one possible explanation of this finding. The raised glucagon levels on the 4th day may explain why there is low gastric acidity at this time despite the gastrin level being higher than at birth. No relation could be deduced between the C-terminal reactive glucagon-like immunoreactivity, i.e. pancreatic glucagon level, and the blood glucose level either at birth or on the 4th day of life.

7415 THE BINDING OF GASTRIC MUCOPROTEIN TO CELLS IN TISSUE CULTURE AND THE INHIBITION OF CELL ADHESION. *(E.)* Allen, A.; Minnikin, S. M. (Dept. Biochem., Univ. Newcastle upon Tyne, England). *Biochem. Soc. Trans.* 2(4):633-635, 1974.

The binding of blood-group-active mucoprotein from pig gastric mucoprotein to baby hamster kidney cells in tissue culture and the inhibition of baby hamster kidney cell adhesion by different mucoprotein preparations was studied with radioactive labeling techniques. Radioiodine-labeled mucoprotein at 37 C in Tris-buffered saline was used to incubate monolayers of baby hamster kidney cells harvested by mild trypsinization; after incubation, the cells were separated from the unbound radioiodine-labeled mucoprotein by centrifugation for subsequent counting for radioactivity. The gastric radioiodine-labeled mucoprotein bound rapidly to the cells, approaching maximum binding after the first 5 min of incubation. Saturation occurred when the amount of labeled mucoprotein added to a constant number of cells was increased, with the amount bound 10^6 cells being 93 μg mucoprotein. Alternatively, if more cells were added to a constant amount of labeled mucoprotein, the amount of protein bound increased; however, a maximum binding was reached when 7.2% of the total labeled mucoprotein was bound, and no further reaction occurred with the addition of more cells. This suggested that only a small proportion of the radioiodine-labeled mucoprotein molecules have the necessary structural requirements for binding to the kidney cells. The binding of the mucoprotein to the kidney cells was dependent on the presence of divalent cations in the medium and was considerably decreased at 4 C. Different preparations of gastric mucoprotein (pepsin digested mucoprotein, water-soluble mucoprotein, and water-soluble mucus purified by equilibrium density-gradient centrifugation in cesium chloride) inhibited adhesion between single baby hamster kidney cells (labeled by growing monolayers in the presence of radiosulfur-labeled methionine) and confluent monolayers of baby hamster kidney cells grown in scintillation vials. Comparable concentrations of bovine serum albumin, glycogen, and hyaluronic acid had no effect on adhesion. The inhibition of the adhesion by the gastric mucoprotein was consistent with results of the radioiodine-labeled mucoprotein-binding experiments and showed that the binding was a cell surface phenomenon.

7416 GASTRIN CONCENTRATIONS IN UPPER GASTROINTESTINAL MUCOSA IN DOGS. *(E.)* Watson, L. C.; Reeder, D. D.; Becker, H. D.; LaGrone, L.; Thompson, J. C. (Univ. Texas Med. Br., Galveston). *Surgery* 76(3):419-422, 1974.

Total gastrin content was determined in mucosa from different levels of the gastrointestinal tracts from 9 healthy mongrel dogs (20-25 kg weight). The highest concentration of gastrin was found in the antral mucosa, with concentrations becoming progressively smaller as tissue more distal to the stomach was extracted. Average total gastrin contents for the 9 dogs, tabulated by mucosal level, were as follows: fundus, 4028 ng; antrum, 296,800 ng; proximal duodenum, 1072 ng; distal duodenum 1308 ng; proximal jejunum, 1892 ng; distal jejunum, 2207 ng; and ileum, 1138 ng. Total gastrin content in the entire small bowel mucosa plus the gastric fundic mucosa was only 4% of the total amount of gastrin measured in the gastric antral mucosa, with the major part of fundic and antral mucosal gastrin consisting of the small heptadecapeptide molecular form. While the content of gastrin in extra-antral mucosa of the dog is not nearly as large as in man, future gastric physiology studies should recognize that extra-antral sources of gastrin exist and are of physiologic importance.

7417 EFFECTS OF BURIMAMIDE, AN ANTAGONIST OF H-2 HISTAMINE RECEPTORS, IN THE GASTRIC FISTULA DOG. *(E.)* Hirschowitz, B. I. (Div. Gastroenterol., Univ. Alabama, Birmingham). *Am. J. Dig. Dis.* 19(9):811-817, 1974.

Step-dose responses (45 min) in 6 gastric fistula dogs (average weight 21.8 kg, with Komarov esophagostomy and gastric cannula) were examined for the effect of a 500 μg/kg/hr infusion of burimamide, an H-2 histamine receptor antagonist, acting against histamine (2-100 μg/kg/hr), pentagastrin (0.1-5.0 μg/kg/hr), betazole (50-5000 μg/kg/hr), and 2-deoxy-D-glucose (100 mg/kg). Histamine dose responses in the 6 dogs with and without the burimamide background were essentially alike, with the same volume, acid, chloride, potassium, and pepsin output. Acid and especially pepsin output, as well as volume, chloride and potassium outputs, were reduced by the same dose of burimamide when given as background to betazole. Pentagastrin administration to 3 of the dogs against the burimamide background resulted in a 10% reduction of acid output and a 90% reduction of pepsin output. Burimamide had little effect on the shape of either the acid or pepsin output curves of dogs administered 2-deoxy-D-glucose; if anything, the acid output was increased by burimamide. Larger doses of burimamide, 1-5 mg/kg/hr, produced side effects, especially retching and diarrhea, which precluded studies of these doses. The decrease in pepsin secretion with pentagastrin stimulation, where acid output was only minimally reduced, and the lack of response following stimulation with 2-deoxy-D-glucose, were in contrast to previous findings with another H-2 antagonist, metiamide, where pepsin output with 2-deoxy-D-glucose or urecholine was increased while acid output was decreased.

7418 CO_2 DIFFUSION INTO FROG GASTRIC MUCOSA AS RATE-LIMITING FACTOR IN ACID SECRETION.

(E.) Kidder, III, G. W.; Montgomery, C. W. (Univ. Maryland Sch. Dent., Baltimore). *Am. J. Physiol.* 227(2):300-304, 1974.

Steady-state acid secretory rates in gastric mucosa from the bullfrog (*Rana castebeiana*) were measured with a Radiometer Titrigraph, using 0.10 N sodium hydroxide in mucosal fluid as the titrant, to verify whether such mucosa can be made to secrete at apparently normal rates in the absence of exogenous carbon dioxide by replacing the bicarbonate in the serosal medium with phosphate, acetate, or succinate at pH 4.5. Removal of all CO_2 and bicarbonate reduced the secretory rate to 24 ± 3% of the control value obtained with standard solutions of 5% CO_2 on both the mucosal and serosal sides of the tissue. Replacement of carbonate by phosphate at pH 4.4, in the absence of CO_2, raised the rate to control values of 98 ± 5%. Replacement of carbonate with 25 mM of acetate, succinate, lactate, or citrate raised acid secretory rates to 116 ± 5%, 116 ± 4%, 59 ± 4%, and 34 ± 4% of control values. Increasing the standard 5% CO_2 solutions to 10% CO_2 on both serosal and mucosal surfaces gave maximum secretion, while inhibition was observed at 20% CO_2 concentrations, perhaps resulting from oxygen limitation. Calculations of the diffusional system involved in CO_2 entry indicated that the rate-limiting step is likely to be the diffusion of CO_2 into the tissue. The use of 10% CO_2 concentrations on both serosal and mucosal sides of the gastric tissue is recommended for further studies since this change results in a 10-20% increase in acid secretory rate as compared to 5% CO_2 on both sides and nearly doubles the rate as compared to 5% CO_2 on the serosal side alone.

7419 ORIGIN OF GASTRIN IN GASTRIC JUICE. *(E.)*

Jordan, Jr., P. H.; Yip, B. S. S. C. (Baylor Coll. Med., Houston, Tex.). *Am. J. Surg.* 128(3):336-339, 1974.

Four dogs were prepared with a Heidenhain pouch, an innervated antral pouch separated from the fundus by a mucosal bridge, and a gastric fistula of the vagally innervated portion of the stomach. Gastrointestinal continuity was reestablished by gastrojejunostomy. Gastric secretion was stimulated by constant perfusion of the antrum with a suspension of liver powder or by s.c. betazole injection. Both methods of stimulation produced an increase in gastric secretion from both the gastric fistulas and the Heidenhain pouches. As the acid secretion increased, the concentration and total amount of gastrin in the gastric juice also increased. There was a direct correlation between the amounts of acid and gastrin in the gastric juice from both the gastric fistulas and the Heidenhain pouches. With liver perfusion, the serum gastrin levels increased, peaking 1 hr after perfusion was begun; with betazole stimulation, there was no significant change in serum gastrin. The data indicate that gastrin in the gastric juice originates in the antrum or some extragastric source and is cleared from the blood by the fundic mucosa. Its rate of appearance in the gastric juice is directly related to the secretory activity of the parietal cells.

7420 EFFECT OF HISTAMINE, PENTAGASTRIN AND THEOPHYLLINE ON THE PRODUCTION OF CYCLIC AMP IN ISOLATED GASTRIC TISSUE OF THE GUINEA PIG.

(E.) Karppanen, H. O.; Neuvoneu, P. J.; Bieck, P. R.; Westermann, E. (Med. Coll., Hanover, Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 284(1):15-23, 1974.

The effects of histamine, pentagastrin, and theophylline on the production of cyclic adenosine monophosphate were studied in minced gastric tissue and isolated gastric mucosa of the guinea pig. Theophylline (10^{-3} M), but not histamine (10^{-3} M), increased cyclic AMP by 180 pM/g in the presence of high concentrations of minced tissue (200-300 mg/2 ml incubation medium); whereas histamine (6 x 10^{-4} M), but not theophylline (10^{-3} M) caused a slight elevation of cyclic AMP in small amounts of isolated gastric mucosa (2-4 mg protein/2 ml). Histamine and theophylline in combination caused marked elevations in cyclic AMP levels in both minced tissue and isolated mucosa. The increase of cyclic AMP was inversely related to the amount of minced tissue in the incubate and was inhibited in isolated mucosa by the histamine H_2-receptor antagonist burimamide. The histamine H_1-receptor blocking agent diphenhydramine had no such inhibiting effect. Pentagastrin, either alone or in combination with theophylline, did not significantly change the cyclic AMP level in isolated mucosa. The results support the view that the histamine-induced secretion of gastric acid is mediated *via* cyclic AMP formed in response to stimulation of histamine H_2-receptors. Pentagastrin-induced stimulation of gastric acid, on the other hand, does not appear to be mediated by cyclic AMP in parietal cells.

7421 COMPARATIVE STUDY OF PYLORIC AND FUNDIC ACID PROTEASES IN THE GUINEA PIG GASTRIC MUCOSA: EVIDENCE FOR A PYLORIC PEPSINOGEN. *(E.)*

Cheret, A. M.; Soumarmon, A.; Lewin, M.; Amar-Costesec, A.; Bonfils, S. (Hosp. Bichat, Paris, France). *Comp. Biochem. Physiol.* [*A*] 49A(2):241-249, 1974.

Enzymatic studies were performed on homogenates of pyloric and fundic mucosa obrained from 12 groups of guinea pigs (each group consisting of 3-15 animals) to determine the enzymatic criteria and electrophoretic patterns of acid proteases from pyloric extracts with reference to pepsinogen from the fundic part of the stomach. Very similar results were obtained for both tissues. The Michaelis constant was defined at approximately 10^{-4} M. Proteolytic activity, studied for pH ranging from 1.0-6.5 at an ionic strength of 0.125 M, had an optimum at pH 1.6 and a temperature of 50 C. The activation energy was 10 kcal/M of substrate. Heat inactivation curves did not differ for pyloric and fundic extracts, and electrophoretic patterns were similar for both extracts. The close similarity of the enzymatic behavior and electrophoretic pattern for both the pyloric and fundic extracts support the evidence for pyloric pepsinogen strongly identical to fundic pepsinogen in the guinea pig.

7422 AN ATPase FROM DOG GASTRIC MUCOSA: CHANGES OF OUTER pH IN SUSPENSIONS OF MEMBRANE VESICLES ACCOMPANYING ATP HYDROLYSIS. *(E.)* Lee, J.; Simpson, G.; Scholes, P. (Biochem. Dept., ICI Pharm. Div., Macclesfield, Cheshire, England). *Biochem. Biophys. Res. Commun.* 60(2):825-832, 1974.

An ATPase system with similar properties to a potassium-stimulated magnesium-dependent ATPase isolated in the microsomes of bullfrog oxyntic cells is demonstrated for microsomal fractions isolated from dog gastric mucosa. Michaelis constant data for ATP of Mg-ATPase are reviewed for microsomal and mitochondrial fractions of gastric mucosa from the dog, cat and frog (*R. temporaria*). Gramicidin, valinomycin, and nigericin enhance the Mg-ATPase activity of the microsomal fraction from dog gastric mucosa when assayed in the presence of K ions, establishing a similarity between this mammalian system and the amphibian systems studied previously. Similar observations can also be made with microsomal fractions from cat gastric mucosa. Microsomal Mg-ATPase from the gastric mucosa of the dog, cat, and frog has a Km for ATP in the region of 20-25 μM and can be differentiated from the mitochondrial Mg-ATPase by the value of this coefficient. The Mg-ATPase isolated from the dog gastric mucosa studied appears to be located in the ion impermeable membrane of microsomal vesicles, and ATP hydrolysis driven changes of the outer pH in suspensions of microsomal vesicles can be observed. The data are consistent with the ATP hydrolysis driven entry of hydrogen ions across the vesicle membrane.

7423 AMOUNTS OF ACID AND OF CHLORIDE IN THE RESIDUAL GASTRIC CONTENTS IN HEALTHY PERSONS. *(E.)* Williams, R. H. M.; Hunt, J. N. (Guy's Hosp. Med. Sch., London, England). *Guys Hosp. Rep.* 122(1/2):161-167, 1973.

A method is described for determining the amount of acid and chloride in the resting stomach of humans. Subjects, (4 women and 8 men) who fasted overnight, had instilled and immediately recovered 250 ml of distilled water *via* a nasogastric tube. Acid concentration of the recovered fluid was determined by electrometric titration while chloride content was assessed by titration with silver nitrate in the presence of nitric acid using a silver electrode. Actual total gastric acid and chloride was then calculated from these data. Under these conditions, the mean H^+ content of the stomach was 0.9 mM with 75% of the 118 estimations being less than 1 mM. Mean gastric chloride content was 3.1 mM. The mean volume of gastric secretion was 22 ml with a mean acidity of 38 mM/liter. Based on these findings, the amount of gastric acid is small compared to the relative antacid content of most commercial antacid preparations.

7424 THE ACTIVE SITE OF PEPSIN. *(E.)* Fruton, J. S. (Kline Biol. Tower, Yale Univ., New Haven, Conn.). *Accounts Chem. Res.* 7(8):241-246, 1974.

7425 REGULATION OF SERUM GASTRIN LEVEL IN THE RAT. *(E.)* Liedberg, G.; Hakanson, R.; Rehfeld, J.; Stadil, F. (Dept. Surg., Univ. Lund, Sweden). *Scand. J. Gastroenterol.* 9(27):38-39, 1974.

7426 CHANGES IN THE GASTRIC MUCOSAL BARRIER CAUSED BY ACETYLSALICYLIC ACID. *(E.)* Miglioli, M.; Di Febo, G.; Barbara, L.; Sabbioni, R.; Lami, F.; Labo, G. (Inst. Pathol. Med. I, Univ. Bologna, Italy). *Rend. Gastroenterol.* 5(3):232-233, 1973.

7427 THE USE OF THE HEIDELBERG CAPSULE IN ANTACID STUDIES. *(E.)* Ekenved, G.; Walan, A. (Hassle Med. Dept. AB, Goteborg, Sweden). *Scand. J. Gastroenterol.* 9(27):41-42, 1974.

7428 INFLUENCE OF GASTRIN ON CELL PROLIFERATION IN CANINE GASTRIC MUCOSA: COMPARATIVE STUDY ON ANTRAL AND FUNDIC MUCOSA. *(E.)* Willems, G.; Vansteenkiste, Y.; Casteleyn, P. (St. Pierre Hosp., Brussels, Belgium). *Digestion* 10(3):245-246, 1974.

7429 INTERACTIONS BETWEEN OXIDATIVE METABOLISM AND ACID SECRETION IN GASTRIC MUCOSA. *(E.)* Hersey, S. J. (Dept. Physiol., Emory Univ., Atlanta, Ga.). *Biochim. Biophys. Acta* 344(2):157-203, 1974.

7430 FORMATION OF N-NITROSOPYRROLIDINE IN A DOG'S STOMACH. *(E.)* Mysliwy, T. S.; Wick, E. L.; Archer, M. C.; Shank, R. C.; Newberne, P. M. (Dept. Nutr., Massachusetts Inst. Technol., Cambridge). *Br. J. Cancer* 30(3):279-283, 1974.

7431 DISAPPEARANCE HALF-TIME OF AUTOGENOUS ANTRAL GASTRIN IN CIRCULATION. *(E.)* Villar, H. V.; Reeder, D. D.; Brandt, Jr., E. N.; LaGrone, L.; Thompson, J. C. (Univ. Texas Med. Branch, Galveston). *Physiologist* 17(3):349, 1974.

7432 HISTAMINE OUTPUT FROM THE RAT GASTRIC MUCOSA DURING STIMULATION AND INHIBITION OF ACID SECRETION. *(E.)* Main, I. H. M.; Whittle, B. J. R. (Sch. Pharm., Univ. London, England). *J. Physiol. (Lond.)* 241(1):53P-55P, 1974.

7433 SUPPRESSION OF GASTRIC SECRETION BY ANTIBODIES TO GASTRIN. *(E.)* Watayou, T.; Booth, R. A. D.; Villar, H. V.; Rayford, P. L.; Reeder, D. D.; Thompson, J. C. (Univ. Texas Med. Branch, Galveston). *Physiologist* 17(3):354, 1974.

7434 VAGAL INHIBITION OF CANINE GASTRIC SECRETION. *(E.)* Sjodin, L. (Karolinska Inst., Stockholm, Sweden). *Acta Pharmacol. Toxicol. [Suppl.](Kbh.)* 35:51, 1974.

7435 EFFECTS OF MONOLATERAL VAGOTOMY, PERFORMED AT DIFFERENT LEVELS, ON GASTRIC SECRETION IN MAN. *(E.)* Basso, N.; Coloni, F.; Mennini, G.; Ricci, C. (Inst. Anat. Surg., Univ. Rome, Italy). *Rend. Gastroenterol.* 5(3):239-240, 1973.

7436 SERUM GASTRIN LEVELS IN FED AND FASTED RATS AFTER VAGOTOMY OR ATROPINE TREATMENT. *(E.)* Wilder, D. E.; Hohnke, L. A. (Pfizer Central Res., Groton, Conn.). *Physiologist* 17(3):359, 1974.

7437 PERMISSIVE ROLE OF GASTRIN IN VAGALLY MEDIATED ACID SECRETION. *(E.)* Adair, L. S.; Shaw, J. E.; Urquhart, J.; Brooks, F. P. (Dept. Physiol., Univ. Pennsylvania, Philadelphia). *Physiologist* 17(3):169, 1974.

7438 EFFECT OF H 81/75 ON GASTRIC ACID SECRETION IN VAGALLY INNERVATED AND DENERVATED ACUTE FISTULA RAT PREPARATIONS. *(E.)* Sundell, G.; Borg, K. O.; Garberg, L.; Sjostrand, S. E. (Pharmacol. Dept., AB Hassle, Molndal, Sweden). *Acta Pharmacol. Toxicol. [Suppl.] (Kbh.)* 35:53, 1974.

7439 EFFECTS OF BOMBESIN ON THE GASTRINAEMIC LEVELS AND GASTRIC ACID SECRETION IN MAN. *(E.)* Delle Fave, G. F.; Corazziari, E.; Melchiorri, P.; Sopranzi, N.; Improta, G.; Mancuso, M.; Torsoli, A. (Clin. Med. II, Univ. Rome, Italy). *Rend. Gastroenterol.* 5(3):238, 1973.

7440 EFFECT OF ENDOGENOUS AND EXOGENOUS CHOLECYSTOKININ ON GASTRIN RELEASE IN MAN AND DOG. *(E.)* Lanciault, G.; Ertan, A.; Adair, L. S.; Brooks, F. P. (Univ. Pennsylvania Sch. Med., Philadelphia). *Digestion* 10(3):228, 1974.

7441 EFFECTS OF CALCIUM ON ACID SECRETION OF FROG PERFUSED GASTRIC MUCOSA. *(E.)* Lezoche, E.; Fiocca, F.; Giri, S.; Basso, N. (Inst. Anat. Surg., Univ. Rome, Italy). *Rend. Gastroenterol.* 5(3):240-240a, 1973.

7442 GASTRIC SECRETORY EFFECTS OF CHLORALOSE AND DEKAMINE ANESTHESIA. *(E.)* Saik, R. P. (Univ. California Sch. Med., San Diego). *J. Surg. Res.* 17(2):85-89, 1974.

7443 TRYPSINOGEN ACTIVATION PEPTIDE AND RELATED PEPTIDES AS INHIBITORS OF GASTRIC SECRETION. *(E.)* Bower, J. M.; Hayward, C. F.; Morley, I. S.; Morley, J. S. (Imperial Chem. Ind. Ltd., Cheshire, England). *Biochem. Biophys. Res. Commun.* 60(2):820-824, 1974.

7444 FUNCTION OF THE STOMACH IN NUTRITION. *(Cz.)* Masek, J.; Skala, I.; Vulterinova, M. (Res. Ctr. Metab. Nutr., Prague, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 28(3):208-214, 1974.

7445 ELECTROLYTE CONCENTRATION IN GASTRIC JUICE IN RELATION TO THE TWO-COMPONENT THEORY OF GASTRIC SECRETION. *(Cz.)* Jablonska, M.; Komarkova, A.; Campr, J. (Fac. Gen. Med., Charles Univ., Prague, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 28(2):122-126, 1974.

7446 EFFECT OF SPLANCHNIC NERVE STIMULATION AND BLOCKING ON THE ELECTROLYTE COMPOSITION (Ca, K, Na, Cl) AND ATPase ACTIVITY IN THE GASTRIC MUCOSA AND SERUM OF DOGS. *(Ukr.)* Olienik, I. F. (O. O. Bohomol'ets Inst. Physiol., Kiev, USSR). *Fiziol. Zh.* 19(4):465-470, 1973.

7447 MEASURING THE INTRAGASTRIC pH IN NORMAL CHILDREN BY MEANS OF A RADIOTELEMETRIC PROBE. *(Rus.)* Sadchikova, G. N. (Uzbek Inst. Pediatr., USSR). *Pediatriia* (7):11-13, 1973.

7448 SITE OF ASCORBIC ACID IN THE GASTRIC MUCOSA OF THE RAT. EFFECT OF RESTRAINT ULCER AND ULCER INDUCED BY INJECTION OF 2-DEOXYGLUCOSE ON THE CONTENT AND DISTRIBUTION OF THIS COMPOUND. *(Fr.)* Pestis, J.; Gairard, A. (Fac. Pharm. Biol. Sci., Strasbourg, France). *C. R. Soc. Biol. (Paris)* 167 (12):1728-1732, 1974.

7449 EFFECT OF PHENYLBUTAZONE ON THE 5-HYDROXYTRYPTAMINE CONTENT OF THE GASTRIC WALL IN RATS OF DIFFERENT AGES. *(Sl.)* Kohut, A.; Nicak, A. (Pharmacol. Inst., Univ. Kosice, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 28(5):326-330, 1974.

7450 EFFECT OF γ-RADIATION ON A GASTRIC GLYCOPEPTIDE. *(It.)* Sinigaglia, F.; Pallavicini, G.; Cetta, G.; Fossati, F. (Inst. Biochem., Sci. Fac., Univ. Pavia, Italy). *Boll. Soc. Ital. Biol. Sper.* 49(18 bis):no. 158, 1973.

7451 RELATION BETWEEN ANTRAL GASTRIN STORES AND GASTRIC ACID SECRETION. *(Rum.)* Groza, P. (Inst. Med. Pharm., Bucharest, Rumania). *Fiziol. Norm. Patol.* 19(1):1-8, 1973.

7452 THE ROLE OF CARBONIC ANHYDRASE IN THE MECHANISM OF GASTRIC ACID SECRETION. *(Rum.)* Ionescu, S. (Inst. Med. Pharm., Bucharest, Rumania). *Fiziol. Norm. Patol.* 19(1):41-51, 1973.

7453 EXPERIMENTAL EFFECTS OF MASSIVE HISTALOG DOSES ON GASTRIC SECRETION. *(Sp.)* Chahud Isee, A. (Hipolito Unanue Hosp., Lima, Peru). *Rev. Esp. Enferm. Apar. Dig.* 43(3):253-260, 1974.

See also, 7347, 7349, 7353, 7365, 7378, 7384, 7387, 7619, 7623, 7717, 7773, 7779, 7781, 7782, 8103.

Pancreas

7454 PROTEIN OUTPUT BY THE IN VITRO RABBIT PANCREAS. *(E.)*

Welch, R. W.; Littman, A. (VA Hosp., Hines, Ill.). *J. Appl. Physiol.* 37(2): 235-238, 1974.

The protein output of the pancreas in response to pancreozymin and acetylcholine was measured with a modification of the *in vitro* rabbit pancreas preparation described by Rothman. Direct bath administration of either pancreozymin (15 clinical U) or acetylcholine (0.40 mg/kg bath) caused prompt increases in protein output in all experiments. However, administration of a second dose, 20-80 min later, failed to cause increased production of protein. *In vitro* preparations were then modified so that the arterial supply was preserved and used as the stimulus route. In 3 experiments, hourly doses of pancreozymin (15 clinical U) caused the pancreas to respond repetitively. In 4 experiments, 4 different doses of acetylcholine (2, 4, 8, and 16 μg) given in randomized order at hourly intervals invariably produced repetitive responses. In 3 of the experiments, the responses were clearly proportional to the log of the dose, suggesting *in vitro* secretory activity. A single experiment with 3 different doses of pancreozymin also demonstrated a log-linear relation. The *in vitro* rabbit pancreas responds in a more physiologic fashion when secretory stimulants are given by artery.

7455 MODULATION, BY FOOD, OF HORMONAL SYSTEM REGULATING RAT PANCREATIC SECRETION. *(E.)*

Felber, J. P.; Zermatten, A.; Dick, J. (Cantonal Hosp., Univ. Lausanne, Switzerland). *Lancet* (7874): 185-187, 1974.

A study was made of the effect of different food substrates on the mucosal production of factors acting on the endocrine and exocrine functions of the pancreas. Loads of 2 g/kg glucose, arginine, lysine, peanut oil, or protein hydrolysate were given p.o. through a stomach tube to donor rats. The duodenum was removed at various times after food was given and extracts of duodenal mucosa were injected into an *in situ* pancreas preparation in receptor rats. The effect of the extract was determined by measuring immunoreactive insulin levels in the portal vein and amylase and trypsin activities in the pancreatic juice of receptor rats. Glucose and arginine, but not lysine, increased the β-cytotropic activity of the mucosal extracts. In contrast, extracts taken 45 to 60 min after peanut oil inhibited insulin release. Duodenal extracts taken 30 min after glucose ingestion stimulated amylase but not trypsin activity in pancreatic juice, whereas extracts taken 5 and 45 min after ingestion of a protein hydrolysate stimulated trypsin but not amylase activity. These findings suggest the possibility of a hormonal system which is modulated by different food substrates and influences both endocrine and exocrine pancreas functions.

7456 A COMPARISON OF ENZYME ACTIVITIES IN DUODENAL ASPIRATE FOLLOWING INJECTION OF SECRETIN, CAERULEIN, AND CHOLECYSTOKININ. *(E.)*

Vandermeers-Piret, M. C.; Vandermeers, A.; Rathe, J.; Christophe, J.; van der Hoeden, R.; Wettendorff, P.; Delcourt, A. (Univ. Brussels Med. Sch., Belgium). *Digestion* 10(3):191-204, 1974.

Pancreatic α-amylase, protease, trypsin, chymotrypsin and lipase activities were studied in pancreatic secretions obtained by duodenal aspiration in 32 healthy subjects at various times following stimulation by i.v. injection of secretin (1 U/kg), cerulein (40 ng/kg), or cholecystokinin (1 Ivy dog U/kg) alone or in combination. In 18 subjects secretin was injected followed 60 min later by cerulein. A maximum rise in hydrolase concentrations was noted within 10 min after cerulein administration for the 2 proteases and lipase, and within the first 5 min for amylase. Secretin followed by cholecystokinin was given to 6 subjects with a response similar to that observed in the secretin-cerulein group. A 3rd group of 8 subjects received combined secretin-cerulein followed by cholecystokinin. Although a rapid elevation in hydrolase activity was noted after the secretin-cerulein injection, subsequent cholecystokinin stimulation provoked a further 3-fold increase in trypsin and chymotrypsin concentrations within 10 min with lesser elevations of amylase and lipase. In general, lipase and amylase response was delayed with respect to that of the 2 proteases, and it is suggested that trypsin or chymotrypsin levels may be more indicative of pancreatic activity than is lipase.

7457 PANCREATIC ACINAR CELLS: USE OF A Ca^{++} IONOPHORE TO SEPARATE AND RELEASE FROM THE EARLIER STEPS IN STIMULUS-SECRETION COUPLING. *(E.)*

Williams, J. A.; Lee, M. (Dept. Physiol., Univ. California, San Francisco). *Biochem. Biophys. Res. Commun.* 60(2):542-548, 1974.

The divalent calcium ionophore A23187 was used to stimulate artificially the secretion of amylase from pancreatic acinar cells obtained from fasted male white Swiss mice. The pancreatic fragments were incubated in Krebs-Henseleit bicarbonate solution, and amylase released into the medium was assayed with amylose azure blue as the substrate. Pancreatic calcium uptake was determined by incubating the pancreas in a medium containing $^{45}Ca^{++}$, followed by postincubation for 1 hr in a Hepes buffered Ringer containing 10 mM lathanum chloride for subsequent scintillation counting. The Ca ionophore had no effect on the release of amylase from mouse pancreas fragments in the absence of calcium, but reintroduction of Ca to the medium rapidly increased amylase release in a manner similar to that observed with cholinergic stimulants. Uptake of radioactive calcium by pancreatic fragments was increased by A23187. Tetracaine and dinitrophenol at concentrations which block cholinergic stimulated enzyme release blocked ionophore induced release, whereas atropine did not. None of the inhibitors studied affected the ionophore-induced calcium uptake. The findings emphasize the importance of Ca in the control of amylase secretion and demonstrate the possibility of studying the release process independent of the steps by which normal stimulants increase intracellular Ca.

7458 EVIDENCE OF NORMAL VITAMIN B_{12} ABSORPTION IN THE PANCREATESCTOMIZED [SIC!] RAT. *(E.)* Von der Lippe, G.; Schjonsby, H. (Med. Dept. A, Univ. Bergen, Norway). *Eur. J. Clin. Invest.* 4(5):332-333, 1974.

7459 EFFECT OF SECRETIN AND GRADED DOSES OF CCK-PZ ON PANCREATIC SECRETION IN MAN. *(E.)* Vaysse, N.; Laval, M.; Duffaut, M.; Ribet, A. (Purpan Hosp., Toulouse, France). *Am. J. Dig. Dis.* 19(10):887-894, 1974.

7460 EFFECTS OF GASTROINTESTINAL HORMONES ON THE LEVELS OF CYCLIC AMP AND CYCLIC GMP IN THE RAT PANCREAS. *(E.)* Deschodt-Lanckman, M.; Robberecht, P.; de Neef, P.; Christophe, J. (Univ. Brussels Med. Sch., Belgium). *Eur. J. Clin. Invest.* 4(5):342, 1974.

7461 RELATION OF NUTRITION TO PANCREATIC FUNCTION AND MORPHOLOGY. *(Sl.)* Bucko, A. (Res. Inst. Human Nutr., Bratislava, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 28(2):141-144, 1974.

7462 SUBDIAPHRAGMATIC TRUNCAL VAGOTOMY AND ITS EFFECT ON RAT PANCREAS AND LIVER IN LONG-TERM EXPERIMENTS. *(Ger.)* Kothe, W.; Albert, H.; Graetz, H.; Nowotny, K. (Surg. Clin., Karl Marx Univ., Leipzig, Germany). *Zentralbl. Chir.* 98(31):1111-1115, 1973.

See also, 7609, 7818.

SECRETION AND METABOLISM

Hepatobiliary Tract

7463 BILE PRODUCTION IN FASTED AND FED PRIMATES. *(E.)* Strasberg, S. M.; Siminovitch, K. A.; Ilson, P. G. (Dept. Surg., Univ. Toronto, Canada). *Ann. Surg.* 180(3):356-363, 1974.

Bile flow was studied in fasted and fed rhesus monkeys to determine whether availability of food or species differences influenced previous experimental data suggesting that monkeys and dogs differ in bile salt independent flow rate and in ability of bile salt secretion to influence bile flow. In the fasting experiments, sodium cholate (2-6 mM/24 hr), sodium taurocholate (2-8 mM/24 hr), and monkey bile (50-200 ml/24 hr) were infused into the duodenum. In the feeding experiments, only sodium cholate was infused. Bile flow was linearly related to bile salt secretion rate in both fasted and fed primates. Bile salt independent flow was extremely variable in fasted primates during infusion of conjugated and unconjugated bile salts, or bile. Bile salts collected from the 5 experimental monkeys were almost 100% conjugated with the exception of 1 animal who was apparently deconjugating infused bile salts due to bacterial contamination. Frequent small feedings resulted in an increased and stabilized bile salt independent flow. These studies indicate that the differences found in previous experiments are probably due to variations in experimental design. The present results may be useful in planning studies of bile formation, especially in biliary tract obstruction.

7464 ENHANCING EFFECT OF CALCIUM IONS ON TRANSPORT OF CHOLESTEROL FROM AQUEOUS SODIUM TAUROCHOLATE-LECITHIN MICELLAR PHASE TO OIL PHASE. *(E.)* Surpuriya, V.; Higuchi, W. I. (Coll. Pharm., Univ. Michigan, Ann Arbor). *J. Pharm. Sci.* 63(8): 1325-1326, 1974.

The influence of calcium ions on the transport of cholesterol from bile-salt lecithin micelles into an oil phase was studied. The experiments involved the preparation of master emulsions with hexadecane and their dilution in sodium taurocholate solutions containing calcium chloride and/or sodium chloride. Radioactive cholesterol was added to the oil for release experiments or the sodium taurocholate-lecithin solutions for uptake experiments. As the calcium ion concentration increased, the sterol transport rate increased until a limiting rate was reached with about a 0.03 M concentration of calcium ions. This limiting rate corresponded to an interfacial barrier permeability coefficient of about 1 x 10^{-6} cm/sec, which was 35-40 times larger than that obtained in the absence of calcium. These results are consistent with the interfacial barrier-controlled mechanism in which the bile salt-lecithin micelle is involved in the rate-determining step at the aqueous-lipid interface. Sodium alone had little effect on the interfacial barrier permeability coefficient. When sodium and calcium ions were both added to the sodium-taurocholate system, the interfacial barrier permeability coefficient for cholesterol increased to 2 x 10^{-6} cm/sec, indicating a synergistic rather than additive effect. Calcium ions may have a more specific effect than sodium ions and could play a key role in lowering the free energy of the activated complex involved in the transport process.

7465 THE SENSITIVITY OF FUNCTION TESTS IN DETECTING LIVER DAMAGE IN THE RAT. *(E.)* Cutler, M. G. (Univ. Birmingham Med. Sch., England). *Toxicol. Appl. Pharmacol.* 28(3):349-357, 1974.

Wistar strain male rats were treated with carbon tetrachloride vapor (160 mg/liter 5 min/day) or sodium selenate (24 mg/liter in drinking water) for 5 months to determine the sensitivity of liver function tests. The hippuric acid test, plasma albumin concentration, and the BSP test were the most sensitive in revealing long-term impairment of liver function. Each of these tests, as well as plasma glutamic pyruvic transaminase activity, showed significant differences between rats of the treated and control groups. Changes in the structure of the liver were more evident than changes in the function. Centrilobular necrosis, fibrosis, and fatty infiltration were apparent in the rats given carbon tetrachloride. Periportal fibrosis, small areas of necrosis, and post necrotic scarring of the liver were seen in the rats given selenate. Both groups of rats showed no significant weight gain. In the carbon tetrachloride-treated animals there was a progressive decrease in weight gain as fibrosis became more severe. Histopathologic examination and plasma pyruvic transaminase were sensitive parameters in detecting liver damage and degree of liver cell necrosis, resp. None of the function tests paralleled the degree of liver fibrosis at 5 months, although some tests showed a correlation with the degree of necrosis. Both liver function tests and histopathological examinations are required for a satisfactory assessment of hepatic integrity in rats exposed to toxic materials.

7466 ATTEMPT TO PRESERVE THE ISCHEMIC LIVER WITH HYDROGEN PEROXIDE: EXPERIMENTAL STUDY ON 21 DOGS.

(Fr.) Depadt, G.; Laurent, J. C.; Bournoville, M.; Verhaeghe, M.; Lagache, G. (Fac. Med. Pharm., Univ. Lille, France). *Lille Chir.* 28(1/2):39-50, 1973.

In experiments performed on 21 male and female dogs, a catheter was inserted into the splenic or ileal vein as far as bifurcation of the portal vein so that the hepatic parenchyma could be perfused. A mesenteric-caval anastomosis was then made to decompress the splanchnic system. The hepatic and gastroduodenal arteries were successively clamped off, and the vein containing the catheter was ligated near the portal bifurcation so that the liver could be perfused while portal blood flow was suppressed. In 21 dogs (group 1), portal perfusion of 100-200 ml hydrogen peroxide (1.5% solution in physiological saline) was begun 30-45 min before blood vessels were clamped off. Then hydrogen peroxide was replaced with 200-300 ml Ringer's solution at 4 C. Hydrogen peroxide was perfused both before and after induction of ischemia in 11 dogs (group 2). The concentration of hydrogen peroxide was the same as in group (1) with the exception of 3 cases in which a 4% solution was used and 2 cases in which an 8% solution was used. Four of these 21 operated dogs served as controls and were not perfused with hydrogen peroxide. Of the 17 experimental animals, 12 died and 5 survived. The death rate increased with the duration of ischemia: 1 of 4 dogs died when the duration of ischemia was 70 min, 1 of 2 after 80 min, 7 of 8 after 90 min, and 3 of 3 after 100 min. While 4 of 10 dogs in group (1) survived, only 2 of 11 survived in group (2). The higher survival rate in group (1) is attributed to the moderate hypothermia obtained when hydrogen peroxide was replaced with Ringer's solution at 4 C. Examination of dogs that died after 48 hr showed blockage of subhepatic veins was the cause of death in 3 cases and hemoperitoneum in 1. Prenecrotic or necrotic lesions found at autopsy consisted of centrilobular necrosis, marked diffuse congestion, structural disorganization, and diffuse liver cell degeneration with atrophy and acidophilia. Determinations of ATP, lactate, and the lactate/pyruvate ratio in the liver, performed before, during, and after ischemia, showed no difference between experimental animals and controls, even when the concentration of hydrogen peroxide was increased to 8%. These findings indicate that portal perfusion of hydrogen peroxide is not effective in alleviating the effects of hepatic ischemia.

7467 THE SUBCELLULAR DISTRIBUTION OF COPPER, ZINC AND IRON IN LIVER AND KIDNEY. CHANGES DURING COPPER DEFICIENCY IN THE RAT.

(E.) Alfaro, B.; Heaton, F. W. (Dept. Biol. Sci., Univ. Lancaster, England). *Br. J. Nutr.* 32(2):435-445, 1974.

The subcellular distribution of copper, zinc, and iron was investigated in liver and kidney homogenates from 2 groups of 24 weanling male Wistar albino rats randomly selected and fed Cu-deficient or control diets for up to 126 days. Most of the Cu and Zn in control animals was observed in the supernatant fraction, while the highest proportion of Fe was found in the microsomal fraction. Copper deficiency reduced the concentration of the metal in all fractions; but the depletion of copper was most severe and developed most rapidly in the supernatant fraction, indicating that the soluble cytoplasm is the site of Cu storage in the cell. The Fe content of the liver increased during Cu deficiency, with Fe being deposited preferentially in the mitochondria. All of the Cu and most of the Zn in the liver and kidney supernatant fractions occurred in 4 protein-containing fractions that were of similar molecular weights in both organs. A fraction of molecular weight 30,000 was primarily concerned with Cu storage in mature rats. The reduction of liver Zn during Cu deficiency appeared to be the result of impaired intestinal absorption. A small amount of Cu is apparently necessary to facilitate Zn absorption.

7468 EFFECT OF ALTERATIONS OF THE SPECIFIC ACTIVITY OF THE INTRACELLULAR ACETYL COA POOL ON APPARENT RATES OF HEPATIC CHOLESTEROGENESIS.

(E.) Dietschy, J. M.; Brown, M. S. (Univ. Tex. Southwestern Med. Sch., Dallas). *J. Lipid Res.* 15 (5):508-516, 1974.

The specific activity of the intramitochondrial acetyl coenzyme A (CoA) was determined in liver slices of female Sprague-Dawley-derived rats subjected to various manipulations known to alter the rate of cholesterogenesis (fasting, cholesterol feeding, biliary or lymphatic diversion, biliary obstruction). Initial experiments to determine the magnitude and variability of endogenous dilution of the intramitochondrial acetyl CoA pool when radiocarbon-labeled acetate was used as the precursor for cholesterol synthesis resulted in 27-49% of the theoretical specific activity expected if no endogenous dilution occurred. These values could not be used to correct the flux of labeled carbon from radiocarbon-labeled acetate into cholesterol since the cytosolic acetyl CoA pool that gives rise to cholesterol is not in equilibrium with the intramitochondrial pool. In subsequent experiments, radiocarbon-labeled octanoate, which is rapidly oxidized intramitochondrially to acetyl CoA which feeds both the intra- and extramitochondrial metabolic pathways, was used to determine true flux rate of C_2 units into cholesterol and other products. With this substrate, the specific activity of the intracellular acetyl CoA pool was 54-71% of the expected specific activity. After correction for endogenous dilution, the C_2 flux into cholesterol varied from 335-459 nM/g/hr in control animals, was suppressed 10- to 40-fold in animals subjected to fasting and cholesterol feeding, and increased into the range of 1500 nM/g/hr after derepression with cholestyramine feeding or biliary diversion. Good agreement between the corrected C_2 flux rate from octanoate into cholesterol and microsomal hydroxymethylglutaryl CoA reductase activity in the same liver was obtained for conditions in which the synthetic rates were varied over a 100-fold range.

7469 IMPORTANCE OF TESTES IN INDUCTION OF HYPERPLASTIC NODULES, CARCINOMAS, AND CIRRHOSIS OF LIVER IN A X C MALE RATS INGESTING 0.025% N-2-FLUORENYLDIACETAMIDE. *(E.)* Reuber, M. D. (Natl. Cancer Inst., Bethesda, Md.). *J. Natl. Cancer Inst.* 53(3):883-886, 1974.

The dependence of hepatic carcinogenesis on the testes was studied in 4 groups (23-26 animals each) of inbred A X C male rats ingesting 0.025% N-2-fluorenyldiacetamide (F-diAA). The experimental groups consisted of intact rats with normal testes, rats with one normal testis, rats with one atrophic testis related to a congenital defect, and rats without testes. The incidence of carcinomas and the number of rats with multiple carcinomas, and metastases were highest in intact rats. The incidence and size of the carcinomas not only decreased in animals with one or both testes removed but also decreased in relation to the bulk and weight of the testis in rats from the other groups. Carcinoma incidence was lowest in rats with both testes removed. The results confirmed the importance of the testes in F-diAA hepatic carcinogenesis, making this model valuable for studies on hepatic carcinogenesis.

7470 AN ORGAN CULTURE OF RAT LIVER. *(E.)* Mattheyse, F. J.; Balinsky, J. B. (Dept. Chem., Univ. Witwatersrand, Johannesburg, South Africa). *S. Afr. J. Sci.* 70(3):90, 1974.

An organ culture of rat liver is described which consists of 1 mm-thick slices of liver supported by filter paper. The paper rests on the edges of the center well of a Conway unit which contains culture medium. The medium consists of 50% bovine serum, 10% whole egg ultra-filtrate, and 40% M199 in Hank's balanced salt solution; and the culture is maintained in an atmosphere of 95% oxygen and 5% carbon dioxide at 20 C for periods of up to 24 hr. Sections of adult liver cultures stained after 24 hr with hemotoxylin-eosin showed about 80% viability; some necrosis was seen in the tissue interior at distances more than 0.3 mm from the surface, with the degree of necrosis being a function of the culture slice thickness. Tissue viewed in the electron microscope showed all organelles intact, though there appeared to be some dilation of cytoplasmic and mitochondrial membranes. Pulse-labeling the cultures with tritiated orotate and leucine after 0, 12, and 24 hr resulted in the appearance of label in trichloroacetic acid-precipitable fractions of homogenates, indicating active protein and RNA synthesis. No decrease in the incorporation rate occurred after 24 hr. Specific activities of urea cycle enzymes in the culture remained virtually unchanged during the 24-hr incubation period. Glutamate dehydrogenase, which is inducible by cyclic-AMP *in vivo*, was also induced *in vitro* in this culture and showed a 2-fold increase in specific activity compared to that in normally cultured controls after 24 hr in the presence of 0.4 mm dibutyryl cyclic AMP. Neonatal and early postnatal liver cultured in this way for 24 hr appeared normal when viewed with either light or electron microscopy and incorporated label into both RNA and protein.

7471 THE ISOLATION OF HORMONE-SENSITIVE RAT HEPATOCYTES BY A MODIFIED ENZYMATIC TECHNIQUE. *(E.)* Zahlten, R. N.; Stratman, F. W. (Inst. Enzyme Res., Univ. Wisconsin, Madison). *Arch. Biochem. Biophys.* 163(2):600-608, 1974.

A modified enzymatic technique for the isolation of rat hepatocytes that exhibit a glucagon response similar to the perfused liver is described which does not require a temperature-controlled perfusion chamber. Major modifications include: a temperature-controlled apparatus for the recirculating perfusion of the isolated liver, the use of substrate-fortified calcium-free Krebs-Henseleit bicarbonate buffer, and high perfusion rates which lead to the isolation of hepatocytes with normal ultrastructure and metabolic activities. The flow rate of the recirculating system should be above 60 ml/min for sufficient oxygenation and rapid digestion. The calcium-free perfusate buffer is prepared from the following solutions: 80 ml 0.154 M sodium chloride, 4 ml 0.154 M potassium chloride, 3 ml water, 1 ml 0.154 M potassium hydrogen phosphate, 1 ml 0.154 M magnesium sulfate (hydrated), 21 ml 1.3% sodium bicarbonate, 4 ml 0.16 M sodium pyruvate, 7 ml 0.1 M sodium fumarate, 4 ml 0.16 M sodium L-glutamate, and 5 ml 0.3 M glucose. The calcium-free incubation buffer contains: 100 ml 0.154 M NaCl, 4 ml 0.154 M KCl, 3 ml H_2O, 1 ml 0.154 M KH_2PO_4, 1 ml 0.154 M $MgSO_4 \cdot 7H_2O$, 21 ml 1.3% $NaHCO_3$, and 1.5% gelatin. Experiments with male Sprague-Dawley rats indicate that from 400-500 million cells can be routinely isolated from 8-10 g liver, independent of the collagenase preparations applied. Electron microscopy and the trypan blue exclusion method indicate 90-95% cell viability. The use of gelatin in the incubation medium is preferred to albumin Fraction V or fatty acid-free albumin which tend to inhibit gluconeogenic rates from various substrates in calcium-free media. Addition of calcium chloride to the incubation medium strikingly improves gluconeogenesis from lactate. Various procedures are given for calculating the number of cells corresponding to 1 g wet liver tissue.

7472 SYNTHESIS OF ALPHA-FETOPROTEIN BY MEMBRANE-BOUND POLYSOMES OF RAT ASCITES HEPATOMA CELLS. *(E.)* Kanai, K.; Endo, Y.; Oda, T.; Tanaka, N. (1st Dept. Med., Univ. Tokyo, Japan). *Cancer Res.* 34:1813-1815, 1974.

The ability of free and membrane-bound polysomes of rat ascites hepatoma cells (AH-66) to synthesize α-fetoprotein (AFP) was investigated and the intracellular site of AFP synthesis was determined. AH-66 cells were collected by peritoneal puncture 7 days after inoculation of the tumor cells and were transplanted i.p. to male Donryu rats weighing 100-150 g. Both the free and membrane-bound polysomes incorporated ^{14}C-leucine into AFP *in vitro*, though the amount of radioactivity incorporated into the antiserum-precipitable AFP fraction by membrane-bound polysomes was 20-90 times higher than that incorporated by free polysomes. The results indicate that AFP is synthesized mainly on membrane-bound polysomes in rat ascites hepatoma cells, suggesting that AFP in hepatomas belongs to excretory proteins such as serum albumin.

7473 BILE FORMATION IN THE INTACT PIG. *(E.)* Egger, G.; Kutz, K.; Strebel, H.; Bircher, J.; Weber, M.; Scholl, E.; Preisig, R. (Sch. Med., Univ. Berne, Switzerland). *Am. J. Vet. Res.* 35(9): 1203-1208, 1974.

Bile formation was studied in 6 adult nonanesthetized Swiss white pigs (females), previously cholecystectomized and equipped with a Thomas duodenal cannula, during i.v. infusions of sodium taurocholate. Relative steady states of bile flow were achieved by cholinergic blockade. Linear relations were obtained for bile flow and elimination of inorganic electrolytes with bile salt excretions ranging from 18-118 μEq/min; thus, 0.01 ml water, 1.87 μEq sodium, 0.06 μEq potassium, 0.24 μEq bicarbonate, and 0.69 μEq chloride were excreted/μEq of bile salt. It was possible to define a bile salt-independent fraction of bile, averaging 0.15 ml/min. Canalicular bile formation was assessed with radiocarbon-labeled erythritol in 2 short-term studies with pigs given general anesthesia. Erythritol clearance values were identical with the collected bile volume at low bile salt excretion rates, while at high bile salt excretion rates the bile flow exceeded erythritol clearance by approximately 10%. The results indicate that bile salt formation in the pig, as in man, depends mainly on the excretion of bile salts. The erythritol clearance data suggest that the relative large bile salt-independent fraction defined for the pig is of hepatocytic origin.

7474 CHEMICAL MODULATION OF EARLY CARBON TETRACHLORIDE LIVER INJURY. *(E.)* Reynolds, E. S.; Moslen, M. T. (Peter Bent Brigham Hosp., Boston, Mass.). *Toxicol. Appl. Pharmacol.* 29(3):377-388, 1974.

Histochemical analysis of liver sections from young male Charles River rats given 1:1 dilutions of carbon tetrachloride (0.26-26 mM/kg) in mineral oil by stomach tube and i.p. injections of chemical agents which modulate early *in vivo* CCl_4 effects was performed to investigate the toxic interaction of CCl_4 with liver endoplasmic reticulum. Alterations in known parameters of CCl_4 injury were compared between control rats and experimental rats receiving β-diethylaminoethyl-3,3'-diphenylpropyl acetate (SKF 525A, 100 mg/kg), promethazine (50 mg/kg), N,N'-diphenyl-p-phenylenediamine (DPPD, 600 mg/kg), α-tocopherol acetate or ethylenediaminetetraacetic acid (EDTA, 400 mg/kg). Such agents either inhibit the binding of CCl_4 with cytochrome P-450 or have free radical sequestering and/or antioxidant activities. The extent of suppression of glucose-6-phosphatase staining and increase in stainable calcium were examined at 1 hr after poisoning; lipid conjugated diene contents, NADPH-NT reductase, glucose-6-phosphatase, and oxidative N-demethylase activities of microsomes, *in vivo* protein synthesis, and cell sap RNA were determined 2 hr after poisoning with 26 mM CCl_4/kg. All the chemical modulators either wholly or partially prevented loss of *in vivo* protein synthesis 2 hr after CCl_4 administration. α-Tocopherol and DPPD reduced the extent of histochemically demonstrable glucose-6-phosphatase suppression and blocked the appearance of stainable calcium. Pretreatment with SKF 525A reduced oxidative N-demethylase activity of liver endoplasmic reticulum and also moderated the increase in lipid-conjugated diene following CCl_4; however, SKF 525A was without effect on the magnitude of loss of histochemically determined glucose-6-phosphatase or the influx of stainable calcium. The qualitative differences between the effects of SKF 525A and α-tocopherol on CCl_4-induced changes in liver endoplasmic reticulum indicated that the chlorocarbon may interact at 2 or more loci in the membrane.

7475 HEPATOCELLULAR TOLERANCE TO CARBON TETRACHLORIDE INDUCED INJURY IN THE RAT: A STUDY OF ITS NATURE AND POSSIBLE MODE OF EVOLUTION. *(E.)* Das, P. K.; Chopra, P.; Nayak, N. C. (All-India Inst. Med. Sci., New Delhi). *Exp. Mol. Pathol.* 21(2):218-236, 1974.

Histochemical, microscopic, and α-fetoprotein immunologic studies were performed on male Sprague-Dawley rats given carbon tetrachloride (25-500 μl/100 g) p.o. through a stomach tube The severity of hepatic injury, as assessed by mortality and structural and biochemical alterations, was dose-dependent. Prior exposure of animals to a 25 μl dose of CCl_4 afforded almost complete protection against the severe and lethal effects of a 500 μl dose. The state of tolerance was achieved about 24 hr after the protective dose and continued for the next 48 hr. The tolerant hepatocytes appeared large with vacuolated and clumped cytoplasm. Electron microscopic examination revealed proliferation of rough endoplasmic reticulum and close packing of membrane-attached ribosomes, with polysomes similar to those in prenatal liver cells. α-Fetoprotein was detected in some of the tolerant animals, suggesting that the development of tolerance might be due to alteration of the entire cell to a type having a different complement of enzymes, as in the fetal hepatocyte. Fatty change continued to occur in the tolerant animals following reexposure even though more serious pathological changes were absent, indicating that the toxic effects of CCl_4 might possibly have separate pathways of evolution.

7476 SECRETION OF SERUM ALBUMIN BY ENZYMATICALLY ISOLATED RAT LIVER CELLS. *(E.)*

Weigand, K.; Otto, I. (Univ. Wurzburg Med. Sch., Germany). *FEBS Lett.* 46(1):127-129, 1974.

The net synthesis and secretion of rat serum albumin by enzymatically isolated rat liver cells is described. Protein was determined by the biuret method, albumin by the radial immunodiffusion of Mancini *et al*, and protein-radioactivity by the method of Mans and Novelli. Cell counts were made in a Buerker chamber, and the viability of the cells was estimated by 0.2% Trypan Blue staining. Typical secretion curves of rat serum proteins were obtained from specific radioactivity curves of total protein supernatant after addition of radiocarbon-labeled leucine to the cell suspension. Secretion time was about 10 min as compared to a reported *in vivo* secretion time of 14 min for rat liver. The initial cell suspension contained about 20% Trypan Blue stained cells, with the membranes of the stained cells being defective and perhaps permeable for proteins. A number of cells might also have been destroyed during centrifugation procedures in the isolation. These facts might explain an observed linear component of the measured radioactive protein curves in the supernatant. Serum albumin was not detected in the supernatant before 60 min due to the limited sensitivity of the immunological method. Thereafter, the secretion of albumin was linear for 120 min at a rate of 0.63 $\mu g/10^6$ cells/hr, based on a calculation for a total of $2.39 \pm 0.17 \times 10^6$ cells/ml. A secretion rate of 1.29 $\mu g/10^6$ cells/hr was calculated on the assumption that the stained cells did not synthesize albumin. Assuming that 1 g of liver wet weight contained 1.7×10^8 cells, albumin was secreted at a rate of 45-92 μg/g/hr, as compared to 470 μg reported for fasted liver *in vivo*, 470 μg for isolated perfused liver, and 161 μg for liver slices. After the addition of 0.4 mg/ml puromycin, no protein radioactivity or albumin in the supernatant was found. The basic albumin content of the cell was not released after puromycin addition, suggesting that this albumin pool does not participate in the continual pathway of synthesis and secretion.

7477 STUDIES ON THE BIOGENESIS OF SMOOTH ENDOPLASMIC RETICULUM MEMBRANES IN HEPATOCYTES OF PHENOBARBITAL-TREATED RATS. II. THE SITE OF PHOSPHOLIPID SYNTHESIS IN THE INITIAL PHASE OF MEMBRANE PROLIFERATION. *(E.)*

Higgins, J. A. (Yale Sch. Med., New Haven, Conn.). *J. Cell Biol.* 62(3): 635-646, 1974.

Parallel investigations of the specific activity of the acyltransferases of rough and smooth microsomes from the livers of adult male albino rats confirmed previous cytochemical observations that the acyltransferases involved in the first steps of phospholipid synthesis during new membrane formation are associated with the smooth endoplasmic reticulum in phenobarbital-treated rats but mainly with the rough endoplasmic reticulum in untreated rat liver. The specific activity of the acyltransferases of smooth microsomes rose 3-fold 12 hr after phenobarbital injection (11 mg/g i.p.), while the acyltransferases of the rough microsomes rose slightly, peaking at 3-4 hr and subsequently falling. The latter rise was abolished by treatment of the animal with actinomycin D or puromycin, while that of the smooth microsomes was unaffected. Incorporation of radiocarbon-labeled glycerol into smooth microsome phospholipid was elevated 100% by phenobarbital, while that of the rough microsomes was elevated 15%; this could be accounted for by exchange between the microsomal phospholipids. The phospholipid/protein ratio of the smooth microsomes rose 1.5 times 3-4 hr after phenobarbital injection, while that of the rough microsomes fell slightly. The specific activity of NADPH cytochrome c reductase and NADPH diaphorase rose first in the rough and subsequently in the smooth microsomes at a time coinciding with the return of the phospholipid/protein ratio to the control level. The rise in phospholipid/protein ratio was unaffected by actinomycin D or puromycin. The results indicate that the proliferating smooth membranes are the site of phospholipid synthesis and that the phospholipid/protein ratio of these membranes may change independently.

7478 INDUCTION DEFICIENCY OF THE MICROSOMAL UDPGLUCURONOSYLTRANSFERASE BY 3-METHYLCHOLANTHRENE IN GUNN RATS. *(E.)*

Vainio, H.; Hietanen, E. (Dept. Physiol., Univ. Turku, Finland). *Biochim. Biophys. Acta* 362(1):92-99, 1974.

Induction of microsomal uridine diphosphate (UDP) glucuronosyl transferase by 3-methylcholanthrene (20 mg/kg i.p.) was studied in Wistar rats and in heterozygous and homozygous Gunn rats. The rate of synthesis of *p*-nitrophenylglucuronide by liver microsomes from Gunn strain rats was about 50% that of conventional Wistar rats. The difference was greater in the gastrointestinal mucosa, with Gunn rats exhibiting only about 10% of the UDP glucuronosyl transferase activity of Wistar rats. The hydroxylation step in drug biotransformation (*O*-demethylation of *p*-nitroanisole and hydroxylation of 3.4-benzypyrene) was about equal in the liver microsomes of Gunn and Wistar rats. Aryl hydrocarbon hydroxylase activity in the small intestinal mucosa of Gunn rats was even greater than that in normal Wistar rats. Administration of 3-methylcholanthrene to both normal Wistar and Gunn rats enhanced the drug hydroxylation activity similarly in each rat group; UDP glucuronosyl transferase, however, could not be induced at all in the homozygous Gunn rats, and the heterozygous Gunn rats exhibited a lesser response than that found in the Wistar rats. The existing hepatic UDP glucuronosyl transferase activity in homozygous Gunn rats could, however, be increased *in vitro* by membrane perturbants such as trypsin (5- to 6-fold), digitonin (10-fold), or phospholipase A (7- to 10-fold). The results indicated a constitutional defect in the ability of Gunn strain rats to regulate UDP glucuronosyl transferase activity, though the microenvironment of the drug-metabolizing enzymes appeared to be similar to that in the normal Wistar rats.

7479 BILIARY EXCRETION IN VIVO OF BILE ACIDS SYNTHESIZED BY HEPATOMAS.

(E.) Bricker, L. A.; Marracini, J. V.; Rosenblatt, S.; Kozlovskis, P. L.; Morris, H. P. (Univ. Miami Sch. Med., Fla.). *Cancer Res.* 34(10):2508-2510, 1974.

Normal ACF/Mai female rats on low cholesterol diets and both normal and tumor-bearing (Morris hepatoma 3924A) female rats on tritium-labeled high cholesterol diets received acute bile fistulas and were infused i.v. with radiocarbon-labeled acetate during *in vivo* biliary excretion studies of bile acids synthesized by hepatomas. Prior *in vitro* studies indicated that Morris hepatoma 3924A synthesizes bile acids. Bile acids collected from normal rats on low-cholesterol diets contained radioactive carbon, while bile acids from normal rats on high-cholesterol diets with added tritiated cholesterol contained only tritium. The normal liver appeared to avail itself of either simple precursors of bile acids such as acetate or, alternatively, stored dietary cholesterol. Sterologenically active tissues such as the intestine did not seem to contribute to hepatic bile acid synthesis in the 4-hr time period of the experiments. Hepatoma-bearing rats, in contrast, released bile acids containing both radioactive carbon and tritium in their bile shed when fed tritiated high-cholesterol diets. The origins of these doubly labeled products are suggested to be independent of each other, being of necessity, the tumor and liver, resp.

7480 ULTRASTRUCTURAL EVIDENCE FOR FOETAL LIVER INJURY INDUCED BY IN UTERO EXPOSURE TO SMALL DOSES OF METHYLMERCURY.

(E.) Ware, R. A.; Chang, L. W.; Burkholder, P. M. (Dept. Pathol., Univ. Wisconsin Med. Sch., Madison). *Nature (Lond.)* 251(5472):236-237, 1974.

Ultrastructural examinations for fetal liver injury were performed on 24 pregnant female Sprague-Dawley rats divided into 4 groups of 6 each, with 3 of the groups receiving s.c. injections of 0.5, 0.75, and 1.0 mg of methylmercuric chloride on the 9th day of their gestational cycle. Neither neurological symptoms in the mothers nor gross teratological malformations in the offspring of treated mothers were observed following methylmercuric chloride administration. Newborn pups were anesthetized immediately with ether, and their livers were excised surgically and prepared for microscopic examination. Fetuses from methylmercury-exposed mothers presented a consistent pattern of liver injury, the severity and extent of which was dose dependent. Pathologic changes at the light microscopic level were confined primarily to hepatocytes and consisted of vacuolation, an increase in lysosomal profiles, and cellular necrosis in many cases. Electron microscopic examination of fetal hepatocytes revealed, in addition to the above changes, mitochondrial degeneration, occasional accumulations of lipid droplets, and dilatation of endoplasmic reticulum. Extrusion of hepatocyte cytoplasmic material into the sinusoidal spaces was also common. Mitochondrial changes in hepatocytes consisted of an increasing electronlucid floccular matrix, diminution of cristae, and occasional swelling. The results demonstrated a significant causal relation between maternal exposure to nonteratogenic doses of methylmercury during gestation and fetal liver injury.

7481 EFFECT OF POLINOSINIC-POLYCYTIDYLIC ACID IN DOGS EXPERIMENTALLY INFECTED WITH INFECTIOUS CANINE HEPATITIS VIRUS.

(E.) Wooley, R. E.; Brown, J.; Scott, T. A.; Lukert, P. D.; Crowell, W. A. (Ga. Coll. Vet. Med., Univ. Georgia, Athens). *Am. J. Vet. Res.* 35(9):1217-1219, 1974.

The efficacy of the interferon-inducer double-stranded polyinosinic-polycytidylic acid as an antiviral agent against experimentally induced infectious canine hepatitis was studied in 20 specific-pathogen-free Beagle dogs. Inoculation of dogs with poly I:C (0.2 mg/kg p.o.) 24 hr before i.v. administration of 10^3 plaque-forming U of infectious canine hepatitis virus resulted in longer survival times for treated dogs as compared with nontreated dogs. Dogs treated with poly I:C survived an average of 6.1 days, while controls survived an average of 3.8 days. Interferon was not found in serum samples. However, the sparing effect of poly I:C might be due to the presence of minimal, yet undetectable amounts of circulating interferon that was unable to suppress completely the replication of infectious canine hepatitis virus.

7482 INDEPENDENCE OF CHOLESTEROL AND FATTY ACID BIOSYNTHESIS FROM CYCLIC ADENOSINE MONOPHOSPHATE CONCENTRATION IN THE PERFUSED RAT LIVER.

(E.) Raskin, P.; McGarry, D.; Foster, D. (Univ. Texas Southwestern Med. Sch., Dallas). *J. Biol. Chem.* 249(19):6029-6032, 1974.

Liver slices from male Sprague-Dawley rats were incubated in 5 ml of Kreb's bicarbonate buffer, pH 7.4, containing 4.2 mM sodium 1-^{14}C-acetate or 1.0 mM sodium 1-^{14}C-octanoate in the presence or absence of cyclic AMP. At 5 mM, cyclic AMP caused a 36% depression in the incorporation of 1-^{14}C-acetate into cholesterol and an 82% decrease in its conversion into fatty acids. A similar effect of cyclic AMP at this concentration was noted on cholesterol synthesis from 1-^{14}C-octanoate. At 0.5 mM, cyclic AMP had no effect on the pathway of cholesterol or fatty acid synthesis. Cyclic AMP had no significant effect on CO_2 or ketone body production, suggesting that its effects on cholesterol and fatty acid synthesis were not due to general depression of cellular metabolism. In other experiments, rat livers were perfused for 30 min with 600 µM sodium 1-^{14}C-acetate or 150 µM sodium 1-^{14}C-octanoate in the absence or presence of 10^{-6} M glucagon infused at 1 nM/min. Glucagon caused a 50-fold increase in tissue cyclic AMP levels (0.38 to >16 nM/g) but had no effect on the rates of cholesterol or fatty acid synthesis. This was true with either labeled acetate or octanoate as precursor. Dibutyryl cyclic AMP (0.5 mM) did not inhibit cholesterol or fatty acid synthesis in livers perfused with labeled octanoate. Assays of isolated microsomes showed that the rise in cyclic AMP in intact liver after glucagon treatment did not result in diminished 3-hydroxy-3-methylglutaryl coenzyme A activity. Rates of cholesterol and fatty acid biosynthesis in the intact perfused liver are apparently totally independent of induced changes in intracellular cyclic AMP concentrations over a wide physiological range.

7483 SIALYL TRANSFERASE ACTIVITIES OF RAT ASCITES HEPATOMA CELLS AND RAT LIVER. *(E.)*

Saito, M.; Satoh, H.; Ukita, T. (Fac. Pharm. Sci., Univ. Tokyo, Japan). *Biochim. Biophys. Acta* 362(3): 549-557, 1974.

The effect of cytidine 5'-monophospho-*N*-acetylneuraminic acid (CMP-sialic acid, 10-200 μM) on sialyl transferase activities in rat ascites hepatoma cell homogenate and normal rat liver homogenate was measured using desialized porcine submaxillary mucin as an exogenous acceptor. The K_m values were 0.045 and 0.19 mM for the enzyme of normal rat liver and ascites hepatoma cells, resp. The V of normal rat liver enzyme was 5 times greater than that of the hepatoma cell enzyme. These differences in kinetic constants reflect a quantitative as well as qualitative difference in the enzyme. The ascites hepatoma cell homogenate had 20% of the sialyl transferase activity of normal rat liver homogenates when desialized porcine submaxillary mucin was used as the acceptor and 18% when lactose was the acceptor. The exogenous acceptor, desialized porcine submaxillary mucin or lactose, was removed from the reaction solution and the effect of the enzyme concentration on the incorporation of ^{3}H-sialic acid into endogenous acceptor was determined. Ascites hepatoma cells gave much smaller transfer of radioactivity (50%) than the normal rat liver cells. These results suggested that ascites hepatoma cell homogenate contained acceptors, presumably glycoproteins, that could be utilized by the liver enzymes but not by the hepatoma cell enzymes. Thus, ascites hepatoma cells were homogenized in chloroform-methanol to remove glycolipids. The organic solvent-insoluble fraction without sialyl transferase activity was added to the reaction mixture for sialyl transferase assay, and incorporation of radioactivity into the acid-soluble fraction was examined. The ascites hepatoma cell extract was utilized as an acceptor by normal rat liver enzymes but not effectively by the enzymes in the ascites hepatoma cells. Normal rat liver extract prepared by the same method was not utilized by either enzymes. Therefore, the glycoproteins in hepatoma cells lack a considerable part of the terminal sialyl residues which results in the lower sialyl transferase activity in the hepatoma cells.

7484 A STUDY OF DRUG METABOLISM LINKED TO CYTOCHROME P-450 IN ISOLATED RAT-LIVER CELLS.

(E.) Moldeus, P.; Grundin, R.; Vadi, H.; Orrenius, S. (Dept. Forensic Med., Karolinska Inst., Stockholm, Sweden). *Eur. J. Biochem.* 46(2):351-360, 1974.

The intracellular regulation of drug monooxygenation linked to cytochrome P-450 was studied in liver cells isolated from starved and phenobarbital-pretreated (80 mg/kh for 3 days) male Sprague-Dawley rats. Liver cells were found to catalyze the cytochrome P-450 dependent, oxidative metabolism of alprenolol [1-(2-allylphenoxy)-3-isopropylaminopropanol] at a rate similar to that obtained with the isolated microsomal fraction in the presence of a NADPH-generating system. Alprenolol was rapidly taken up into the liver cells and the apparent Michaelis constant was similar to that obtained with liver microsomes. Further, inhibitors of drug metabolism such as diethylaminoethyl-2,2-diphenylvalerate hydrochloride and metyrapone showed similar inhibitory patterns in the cellular and microsomal systems. With liver cells isolated from control rats, NADPH generation from endogenous substrates was sufficient to support optimal alprenolol metabolism, whereas the addition of glucose or lactate stimulated this rate in liver cells isolated from starved, phenobarbital-treated rats. Inhibitors of mitochondrial respiration such as rotenone, antimycin A and KCN and the uncoupler carbonyl cyanide-*p*-trifluoromethoxyphenyl hydrazone inhibited cellular alprenolol metabolism, presumably by lowering the ATP/ADP ratio thereby interfering with NADPH generation *via* the malic enzyme system; this effect was more pronounced in liver cells from starved rats. Furthermore, in analogy with previous findings, the rate of gluconeogenesis from lactate was inhibited during alprenolol metabolism; this effect in turn was most pronounced in liver cells from phenobarbital-treated rats. The findings indicate that under certain conditions, the level of cytoplasmic NADPH may become rate-limiting for drug metabolism linked to cytochrome P-450 and support the previous assumption that in fed rats, generation of cytoplasmic NADPH is mainly *via* the pentose phosphate shunt whereas the malic enzyme system becomes more important for this purpose during starvation.

7485 THE ISOLATION OF AN AZOBILIRUBIN β-D-MONOGLUCOSIDE FROM DOG GALL-BLADDER BILE.

(E.) Gordon, E. R.; Dadoun, M.; Goresky, C. A.; Chan, T. H.; Perlin, A. S. (Queen Mary Veterans' Hosp., Montreal, Canada). *Biochem. J.* 143(1):97-105, 1974.

An ethyl anthranilate azopigment of bilirubin conjugated to β-D-monoglucoside was isolated from dog gallbladder. Glucose was cleaved from the azopigment by treatment with β-glucosidase (0.5 mg) and β-glucuronidase (0.2 mg/ml). Mild alkaline hydrolysis (sodium methoxide) yielded 2 kinds of components, one water soluble and the other organic soluble. Enzymic analysis, thin-layer chromatography, nuclear magnetic resonance, and combined gas-liquid chromatography and mass spectrometry showed that the water-soluble fraction contained only glucose, primarily β-D-glucose. No evidence for the presence of a disaccharide was obtained. The organic-soluble compounds formed during methanolysis were the isomeric dipyrole azopigments of bilirubin, as indicated by thin-layer chromatography and mass spectrometry. The findings confirm the hypothesis of Fevey *et al* that glucose is a product of mild alkaline hydrolysis of this azopigment from dog gallbladder. The results are unequivocal evidence for the presence of a single β-D-glucopyranose conjugated to bilirubin, and suggest that in this fraction there is no conjugation to a biouronic acid.

7486 DISTRIBUTION OF INORGANIC SULFATE BETWEEN PLASMA, LIVER, AND BILE.

(E.) Williams, J. A.; Kemp, J.; Woodbury, D. M. (College Med., Univ. Utah, Salt Lake City). *Life Sci.* 15(4):741-749, 1974.

The distribution of $^{35}SO_4$ between its inorganic form and its metabolites in plasma, liver and bile of rats was studied by use of paper electrophoresis. Male Sprague-Dawley rats underwent nephrectomy by ligation of the renal pedicles and $^{35}SO_4$ was injected i.p. at various times from 15 min to 12 hr prior to sacrifice. The overall liver sulfate space, calculated from total radioactivity in plasma, bile and liver, varied from 50-100%, but when determined for inorganic $^{35}SO_4$ was constant at 34%. This is considerably higher than that expected for passive distribution and suggests SO_4 is actively transported into liver cells. Overall sulfate bile/plasma ratios were always greater than 1 while the ratio for inorganic sulfate was 0.44, a value consistent with the known bile/plasma electrical potential and suggesting the existence of a steady-state. The finding of the ability of $^{35}SO_4$ to be incorporated into plasma proteins is similar to that previously reported.

7487 COMPARISON OF ANTIGENICITY OF HEPATOMA CELLS, NORMAL LIVER CELLS, FOETAL LIVER CELLS AND CHEMICALLY DAMAGED LIVER CELLS IN GUINEA-PIGS IMMUNIZED WITH HEPATOMATA USING THE MACROPHAGE INHIBITION TEST.

(E.) Desai, H. N.; Dale, M. M. (Dept. Pharmacol., Univ. Coll. London, England). *Br. J. Cancer* 30(2):109-117, 1974.

The macrophage migration inhibition test was used to study the immune responses of guinea pigs immunized with s.c. injections of whole cells of both an allogeneic and a syngeneic hepatoma grown as established cell lines in tissue culture. A clear dose-dependent relation between tumor cell concentration and inhibition of peritoneal exudate cells was seen in immunized animals. No significant migration inhibition occurred in control animals. The migration inhibition was specific for the tumor cell line used for immunization. There was no cross reaction between whole isolated normal liver cells and tumor cells, or between fetal liver cells and tumor cells. Cells from carbon tetrachloride-damaged livers produced an equivalent degree of migration inhibition in both immunized and control animals. In sensitized animals, however, the degree of inhibition caused by CCl_4-damaged cells was significantly lower than that caused by tumor cells. The nonspecific inhibition produced by the CCl_4-damaged cells may have been a toxic phenomenon due to autolysis, a mechanical phenomenon due to obstruction of capillary tubes, or a manifestation of the previously reported autoimmune response to mitochondrial antigens.

7488 A NEW TECHNIQUE FOR IN SITU HEPATIC ISOLATION AND PERFUSION IN THE RABBIT.

(E.) Lerner, M. H.; Epstein, W. H. (New York Univ. Med. Ctr., N.Y.). *J. Surg. Res.* 16(6):611-619, 1974.

A method for isolation and *in situ* perfusion of rabbit liver is described which allows for the separation of hepatic and systemic circulation without requiring shunting of inferior vena caval blood around the liver *via* extracorporeal bypass. Caval circulation is shunted intracorporeally through the liver by a double lumen catheter with an occlusive balloon attachment. The catheter is inserted into the inferior vena cava and passed through the liver so that the occlusive balloon attachment is just past the emptying of the hepatic veins. Perforations in the outer lumen at the junction of the renal veins allow for shunting of the blood from the vena cava through the liver and to the right atrium. Inflation of the balloon attachment prevents mixing of caval and hepatic circulation when the system is in operation. Vena caval circulation is shunted through the bypass catheter while hepatic venous effluent surrounds the bypass catheter and is collected through a small catheter situated at the emptying of the hepatic veins. This catheter passes through the inner lumen of the bypass catheter and exits independently. Both inorganic phosphate and high energy phosphate values obtained from perfused rabbit liver were similar to those in control nonperfused rabbits. A further indication of the structural and metabolic integrity of the perfused liver was the low level of glutamate oxalacetate transaminase in hepatic venous effluents. The *in situ* liver perfusion technique may be used in the study of metabolic processes in the intact organ as well as for the investigation of tissue-tissue interactions. The technique may also be useful in the selective administration of chemotherapeutic agents or drugs in the treatment of liver carcinoma and other hepatic disorders.

7489 EFFECT OF MOLYBDENUM AND COPPER ON RESPIRATION AND OXIDATIVE PHOSPHORYLATION IN HEPATIC MITOCHONDRIA FROM ALBINO RATS.

(Rus.) Mkheian, E. E.; Mashinian, A. Kh. (Erevan Med. Inst., USSR). *Zh. Eksp. Klin. Med.* 12(4):29-34, 1972.

Since molybdenum (Mo) occurs in large quantities in the environment in Armenia, oxidative phosphorylation and oxygen uptake were studied in mitochondria obtained from the livers of rats given Mo (20 and 100 mg/kg/day), Cu (13 or 66 mg/kg/day), or a combination of Mo (20 mg/kg/day) and Cu (13 mg/kg/day) p.o. through a tube for 45 days. In the presence of ADP, the rate of oxygen uptake, measured by using succinate as the substrate, was significantly higher than control values, while the effectiveness of phosphorylation (ADP/O) was decreased in mitochondria from rats given Mo. When rats were given Cu alone, the rate of oxygen uptake in the presence of ADP was decreased as were values for ADP/O. Simultaneous administration of Cu and Mo normalized the rate of oxygen uptake and oxidative phosphorylation in rat liver mitochondria.

7490 DIBENAMINE IMPAIRMENT OF RAT HEPATIC MICROSOMAL ENZYMES AND ITS RELATION TO HEPA-

TOTOXICITY INDUCED BY CCl_4 AND DIMETHYLNITROSAMINE. *(E.)* Stripp, B.; Sipes, I. G.; Maling, H. M.; Gillette, J. R. (Natl. Heart Lung Inst., NIH, Bethesda, Md.). *Drug Metabol. Disposition* 2(5):464-468, 1974.

Dibenamine pretreatment has previously been shown to protect rat liver from the toxic effects of carbon tetrachloride. The effect of dibenamine on the rat liver microsomal mixed-function oxidase system was investigated in this study. Pretreatment of rats with dibenamine HCl (25 mg/kg s.c. 48 and 24 hr before death) decreased the activity of cytochrome P-450-dependent enzymes in hepatic microsomes as judged by the *in vitro* N-demethylation of ethylmorphine and dimethylnitrosamine, and covalent binding of $^{14}CCl_4$ and ^{14}C-dimethylnitrosamine. The decrease in enzymatic activity was probably not due solely to a decrease in the amount of cytochrome P-450, since the observed magnitude of decrease of cytochrome P-450 was less than the degree of inhibition of ethylmorphine N-demethylation and covalent binding of CCl_4. Dibenamine pretreatment may protect rats from the hepatotoxicity of CCl_4 or dimethylnitrosamine by reducing the formation of active metabolites by microsomal enzymes.

7491 TRANSHEPATIC METABOLISM AFTER END-TO-SIDE PORTACAVAL SHUNT IN THE YOUNG PIG. *(E.)* Hickman, R.; Crosier, J. H.; Saunders, S. J.; Terplanche, J. (Med. Sch. Observatory, Cape Town, South Africa). *Surgery* 76(4):601-607, 1974.

End-to-side portacaval shunt was created in 8 pigs aged 40-60 days and metabolic changes were studied by transhepatic sampling techniques and lumbar puncture. Animals were maintained for 2 days postoperatively on i.v. fluids and were then returned o a normal diet. The animals survived a mean of 5 days, with no obvious cause of death but failure o gain weight and inanition. Arterial ammonia evels rose despite maintained hepatic clearance. erebrospinal fluid glutamine levels also rose for he first 2 weeks after shunt and there was signiicant correlation with arterial ammonia levels. ean serum levels of cholesterol, alkaline phosphaase, amylase, and albumin fell after the procedure, ut no changes were noted in acid-base status, osolality, plasma potassium, glucose, aminotranserase, or urea.

492 EFFECT OF ELECTRICAL VAGAL STIMULATION ON CANINE HEPATIC BILE FLOW. *(E.)* Kaminski, . L.; Dorighi, J.; Jellinek, M. (St. Louis Univ. ch. Med., Mo.). *Am. J. Physiol.* 227(2):487-493, 974.

e effects of direct electrical stimulation of the agus nerve on the output and composition of canine epatic bile were evaluated in unanesthetized dogs. le salt concentrations were determined by an autoted modification of the dehydrogenase method. gs were prepared with biliary and gastric fistulas, d electrodes were placed around the vagus nerves. 1 group, the vagus nerves were maintained intact, d in another group they were cut proximal to the electrodes. The nerves were stimulated with 15 V (2.5 msec duration, 50 pulses/sec). Stimulation was evaluated when the enterohepatic circulation was interrupted and when it was maintained by continuous i.v. infusion of sodium taurocholate. When the enterohepatic circulation was maintained, stimulation of cut and intact vagus nerves did not alter bile flow while significantly increasing gastric fistula hydrogen ion output. With the enterohepatic circulation interrupted, stimulation of intact nerves did not alter bile flow; however, stimulation of distal cut ends produced an increase in bile flow and bicarbonate and chloride output. This study indicates that vagal nerve stimulation minimally alters hepatic bile flow and only when the enterohepatic circulation is interrupted.

7493 STUDIES ON THIOACETAMIDE-INDUCED LIVER NECROSIS. *(E.)* Castro, J. A.; D'Acosta, N. D.; De Ferreyra, E. C.; De Castro, C. R.; Diaz Gomez, M. I.; De Fenos, O. M. (Lab. Chem. Biotoxicol., CITEFA, Zufriaegui y Varela, Argentina). *Toxicol. Appl. Pharmacol.* 30(1):79-86, 1974.

Previous reports have indicated that metabolism of thioacetamide to its S-oxide, possibly by the hepatic microsomal cytochrome P-450 hydroxylating system, is necessary for its necrogenic and carcinogenic effects. To gain further insight into thioacetamide-induced liver necrosis, the induction of liver necrosis by thioacetamide (200 mg/kg i.p.) was compared to that by carbon tetrachloride in castrated male Sprague-Dawley rats. At concentrations as high as 20 mM, thioacetamide produced no spectral change on interaction with liver microsomal suspensions, nor did it modify *in vitro* NADPH cytochrome P-450 reductase activity. In contrast to carbon tetrachloride, thioacetamide did not increase peroxidation of microsomal lipids. The ability of thioacetamide to induce liver necrosis was age-dependent. Alterations in the centrilobular zones were 1st observed in 20-day-old rats; 30 day-old rats showed an intense centrilobular necrosis 24 hr after thioacetamide administration. In both 30- and 40-day-old rats, liver cells in the periportal zones were enlarged, and the normal architectural pattern was lost. Thioacetamide produced a greater increase of plasma isocitric dehydrogenase in males than in females, but there was no difference between sham-operated and castrated rats. Thioacetamide-induced liver necrosis was not prevented by prior administration of any of several inhibitors of cytochrome P-450 mediated transformation, and it was as intense in phenobarbital-preinduced rats as in controls. Prior treatment with either cystamine (600 mg/kg p.o.) or disulfiram (1 g/kg p.o.) partially prevented thioacetamide-induced liver necrosis. These results suggest that cytochrome P-450 or NADPH cytochrome P-450 reductase does not mediate the biological activation of thioacetamide.

7494 DECREASED TYROSINE TRANSAMINASE ACTIVITY IN IRON DEFICIENT RAT LIVER. *(E.)* Aye Kyaw; Tin Win; U Hla Pe (Biochem. Res. Div., Dept. Med. Res., Rangoon, Burma). *Biochem. Med.* 11(2): 194-197, 1974.

Tyrosine transaminase activity was assayed in liver homogenates from albino rats fed an iron-deficient diet for 85 days, beginning at age 35 days. Specific activity of the enzyme was 0.38 ± 0.08 nM substrate/mg protein/min in iron-deficient liver compared with 0.63 ± 0.06 nM substrate/mg protein/min in control liver. Addition of pyridoxal phosphate to the assay medium restored the specific activity, suggesting a depletion of the coenzyme pyridoxal phosphate in the iron-deficient rat liver. Tyrosine transaminase activity *in vitro* was not stimulated by addition of ferrous or ferric ions at concentrations from 1.2 X 10^{-5} M to 1.2 X 10^{-3} M. After 85 days of diet, hemoglobin, mean corpuscular hemoglobin concentration, and packed cell volume were decreased in iron-deficient rats while the proportion of reticulocytes was increased. Hepatic iron concentration was 23.0 ± 2.12 μg/g, confirming the nutritional iron deficiency and suggesting that the storage form of iron in the liver was utilized by the iron-deficient animals.

7495 EFFECTS OF VARIOUS BARBITURATES ON HEPATIC MICROSOMAL ENZYMES. A COMPARATIVE STUDY.

(E.) Valerino, D. M.; Vesell, E. S.; Aurori, K. C.; Johnson, A. O. (Milton S. Hershey Med. Ctr., Hershey, Pa.). *Drug. Metab. Disposition* 2(5):448-458, 1974.

Six barbiturates were compared to determine the extent to which they stimulated hepatic microsomal enzymes of mature male rats after 1, 3, 7, and 14 days of daily i.p. administration. Phenobarbital, pentobarbital, secobarbital, thiopental, and barbital stimulated ethylmorphine N-demethylase and aniline hydroxylase activities and increased microsomal cytochrome P-450 content. Stimulatory responses approached or exceeded 200% of control values after 3, 7, and 14 days of daily phenobarbital (100 mg/kg) administration. Responses exceeding 200% of control values were elicited by barbital (150 mg/kg) during the 14-day observation period. Considerably less stimulation occurred with pentobarbital, secobarbital, and thiopental, and none with hexobarbital. Compared on a molar basis, phenobarbital was the most potent stimulatory agent for each microsomal parameter after 3 daily i.p. injections. Correlation coefficients between partition coefficients for these six barbiturates and their stimulatory potencies were less than 0.45 and were considered not to be biologically significant. Oral administration of phenobarbital (100 mg/kg), secobarbital (75 mg/kg), or hexobarbital (150 mg/kg) for 3 consecutive days did not significantly alter the stimulatory response of an identical i.p. dose of each barbiturate. An association appears to exist between plasma half-lives of phenobarbital (10.1 hr), pentobarbital (2.3 hr), and hexobarbital (36.2 min), and their stimulatory potencies. Hepatic radioactivity 24 hr after administration of these 3 barbiturates was directly related to their stimulatory potencies.

7496 BILE ACID METABOLISM IN MAMMALS: VII. STUDIES ON SEX DIFFERENCES IN DEOXYCHOLIC ACID METABOLISM IN ISOLATED PERFUSED RAT LIVER.

(E.) Fisher, M. M.; Price, V. M.; Magnusson, R. J.; Yousef, I. M. (Dept. Med., Univ. Toronto, Canada). *Lipids* 9(10):786-794, 1974.

Sex differences involved in the hepatic metabolism of deoxycholic acid were studied in the isolated perfused livers of Wistar rats. In 20 perfusions, 10 with livers of male and 10 with livers of female rats, 30 μM deoxycholic acid was added to the perfusion medium. In 10 additional perfusions, 5 male and 5 female, 1 μM deoxycholic acid was added. In 10 of the high dose studies, and in the 10 low dose studies, 1 μC deoxycholic acid-C-24-C^{14} was added to 100 ml perfusion medium after 2 hr of baseline perfusion, and the studies were continued another 3 hr. Biliary bile acids were analyzed by combined thin layer and gas chromatography, and the radioactivity of the perfusion medium and liver documented. Although there was no sex difference in total bile acid secretion in the high dose studies, there were sex differences in the bile acid secretion rate and in the quantitative secretion of individual bile acids. The biliary secretion of deoxycholic acid and cholic acid was immediate in the female studies and delayed in the male, and the amounts of cholic acid and sulfated deoxycholyltaurine secreted were considerably greater in the male studies. In the low dose studies, the female liver converted more deoxycholic acid to cholyl-taurine than did that of the male rat. There are, therefore, sex differences in the hepatic metabolism of deoxycholic acid, but these differences are not impressive when physiological amounts of deoxycholic acid are presented to the liver.

7497 EFFECTS OF DIETARY CHOLESTEROL UPON BILE ACID METABOLISM IN GUINEA PIG. *(E.)*

Hansma, H.; Ostwald, R. (Dept. Nutr. Sci., Univ. Calif., Berkeley). *Lipids* 9(10):731-737, 1974.

The bile acid metabolism of young, male albino guinea pigs, fed a diet with or without cholesterol, was studied in a search for the factor(s) which prevent adequate control of their body cholesterol pool. The results indicate that in the cholesterol-fed guinea pig, the synthesis (and excretion) of bile acids is at least 3 times greater than in controls. This is the result of a doubling of the fractional turnover rate and a smaller increase of the pool size. The major increase of the bile acid pool was in the liver. The following factors may contribute to this cholesterol accumulation in the guinea pig: continued endogenous synthesis of cholesterol; continued high rate of intestinal absorption; or failure of neutral sterol excretion to increase. The main bile acid in gallbladder bile and small intestine was chenodeoxycholic acid, with smaller amounts of 7-ketolithocholic and ursodeoxycholic acids. In the cecum, large intestine, and feces, the major bile acid was lithocholic acid.

7498 EFFECT OF 4-METHYLPYRAZOLE AND PYRAZOLE ON THE INDUCTION OF FATTY LIVER BY A SINGLE DOSE OF ETHANOL. *(E.)*

Khanna, J. M.; Kalant, H.; Loth, J.; Seymour, F. (Dept. Pharmacol., Univ. Toronto, Canada). *Biochem. Pharmacol.* 23(21):3037-3043, 1974.

The effects of pyrazole and 4-methylpyrazole on triglyceride accumulation was investigated in the livers of male and female Wistar rats. Pyrazole (272 mg/kg), 4-methylpyrazole (200 mg/kg), or saline was injected i.p. into fasted male and female rats. Ten min later, ethanol (4 or 6 g/kg) or an equicaloric dose of sucrose was given by stomach tube. Hepatic triglyceride levels were measured at 6, 12 or 16 hr after the gavage. With the smaller dose of ethanol, pyrazole reduced the accumulation of triglyceride at 6 hr in females, but not at 12 or 16 hr. In males, ethanol induced relatively little triglyceride accumulation at 6 hr and pyrazole did not affect this, but at 16 hr the triglyceride levels in the ethanol-pyrazole group had not risen as much as in the ethanol-saline group. In contrast to pyrazole, 4-methylpyrazole by itself increased liver triglyceride content, and significantly increased the triglyceride accumulation caused by the smaller dose of ethanol in both males and females at 16 hr. However, 4-methylpyrazole caused a significantly smaller triglyceride accumulation in females at 6 hr after the ethanol, but not in males. With the larger dose of ethanol, both pyrazole and 4-methylpyrazole decreased the accumulation of triglyceride at 16 hr in males. It is concluded that ethanol *per se*, ethanol as a metabolic substrate, and pyrazoles as pharmacological agents with complex actions, may all contribute to the development of acute fatty liver. Because of this complexity of actions, the pyrazole derivatives do not appear to be suitable tools for resolving the problems concerning the mechanism of the production of fatty liver.

7499 ACTIVATION OF ETHANOL METABOLISM BY 2,4-DINITROPHENOL IN THE ISOLATED PERFUSED RAT LIVER.

(E.) Seiden, H.; Israel, Y.; Kalant, H. (Dept. Pharmacol., Univ. Toronto, Canada). *Biochem. Pharmacol.* 23(16):2234-2237, 1974.

The effect of 2,4-dinitrophenol on the rate of ethanol metabolism was studied in the isolated perfused rat livers of male Wistar rats in which ethanol is metabolized at a rate which is 60-70% of that found *in vivo*. Perfusion rate was 5-6 ml/min/g of liver wet weight at a constant portal venous pressure of 14 cm of water. Livers were first perfused with 1 liter of Ringer solution and then with the same solution containing 3 mM ethanol. 2,4-Dinitrophenol was infused at a constant rate through the open end of the Fisher portal vein cannula. The basal rate of ethanol metabolism was on the order of 1.5-2.0 μM/g liver/min. 2,4-Dinitrophenol in concentrations up to 60 μM increased both the rate of oxygen consumption and the rate of ethanol metabolism. Higher concentrations of 2,4-dinitrophenol further increased the rate of oxygen consumption but had no effect on that of ethanol metabolism or even reduced it. After rather long perfusions in the presence of 2,4-dinitrophenol (more than 5 min), removal of the uncoupler did not reverse the rate of alcohol metabolism to basal values, as it did to the rate of oxygen consumption. The data indicate that the rate of ethanol metabolism is limited by the mitochondrial oxidative capacity.

7500 INTERACTION OF ETHANOL AND DRUGS IN 'ACATALATIC' HEPATIC MICROSOMES.

(E.) Vatsis, K. P.; Schulman, M. P. (Univ. Illinois Coll. Med., Chicago). *Clin. Res.* 22(4):671A, 1974.

The proposed similarity of a hepatic microsomal ethanol-oxidizing system to the drug-metabolizing pathway was investigated with mutant acatalasemic mice (C_sb) with thermolabile tissue catalases which become rapidly inactivated at 37 C and pH 7.4. NADPH- and H_2O_2-linked ethanol oxidation was absent in hepatic microsomes from untreated or phenobarbital-treated C_sb mice. Microsomal catalase from C_sb mice was totally inactivated after 15 min at 37 C, while that from genetic controls (C_sa) was unaffected after 1 hr at 37 C. Catalase addition restored ethanol oxidation by microsomes from untreated or phenobarbital-treated C_sb to corresponding values obtained with C_sa mice. NADPH-oxidase and alcohol dehydrogenase activities were equal in both strains and did not exhibit thermolability. Microsomes from both strains showed equal rates of drug metabolism and NADPH-cytochrome c reductase activities, and responded with comparable stimulation to phenobarbital. Despite the absence of ethanol metabolism in C_sb microsomes, ethanol inhibited drug metabolism to the same extent in microsomes from both strains. It was concluded that: 1) catalase + NADPH oxidase are responsible for a microsomal ethanol-oxidizing system; 2) the drug-metabolizing pathway is not a common detoxifying route for ethanol and drugs; and 3) inhibition of the drug-metabolizing pathway by ethanol is nonspecific and unrelated to ethanol oxidation.

7501 PRIMARY SYNTHESIS OF MONOHYDROXY BILE ACIDS IN THE LIVER.

(Ger.) Back, P.; Schumacher, H.; Gerok, W. (Med. Clin., Univ. Freiburg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1300-1303, 1972.

By using gas chromatography and mass spectrometry, bile acids were identified and quantitatively determined in 24-hr urine specimens obtained from an infant with extrahepatic biliary atresia at ages 5-11 months and in material from a liver biopsy taken at age 5 months. In addition to 3β-hydroxy-5-cholen-24-oic acid, which has recently been identified in urine from children with liver disease, the following compounds were identified in the urine specimen obtained at age 5 months: cholesterol and cholic, 3α-, 6α-, 7α-trihydroxycholanoic, deoxycholic, chenodeoxycholic, 3α-, 6α-dihydroxycholanoic, lithocholic, and ursodeoxycholic acids. In later urine specimens, primary synthesis of lithocholic acid decreased, while synthesis of 3α-, 7β-dihydroxycholanoic acid increased. Since intestinal bacteria played no role in the transformation of chenodeoxycholic acid into 3α-, 7β-dihydroxycholanoic acid in this case, this acid must be synthesized by a 7β-hydroxylation reaction. Incubation of the mitochondrial fraction of liver homogenate with $4\text{-}^{14}C$-cholesterol gave lithocholic, ursodeoxycholic, deoxycholic, cholic, and chenodeoxycholic acids, traces of unidentified dihydroxy acids, and a compound tentatively identified as cholestenoic acid. When 3β-hydroxy-5-cholen-24-oic acid was incubated with liver cell fractions, lithocholic and *allo*-lithocholic acids were synthesized. The microsomal fraction and cytosol produced primarily *allo*-lithocholic acid, while the mitochondrial fraction and cytosol synthesized more lithocholic acid. These results demonstrate that in its early stages of development or in severe liver disease, the human liver is capable of directly synthesizing monohydroxy bile acids by mitochondrial side-chain oxidation.

7502 HEPATOTOXICITY OF BROMOTRICHLOROMETHANE—BOND DISSOCIATION ENERGY AND LIPOPEROXIDATION. *(E.)* Koch, R. R.; Glende, Jr., E. A.; Recknagel, R. O. (Sch. Med. Case Western Reserve Univ., Cleveland, Ohio). *Biochem. Pharmacol.* 23(20):2907-2915, 1974.

The pro-oxidant actions of bromotrichloromethane ($BrCCl_3$), CCl_4, and $CHCl_3$ were studied in a supplemented microsome-supernatant system derived from rat liver. $BrCCl_3$ was 200 times more active than CCl_4 in promoting peroxidative decomposition of rat liver microsomal lipids. $CHCl_3$, with a higher bond dissociation energy (i.e., a lesser tendency for homolytic bond cleavage) elicited virtually no pro-oxidant response *in vitro*. At equivalent doses (1 ml/kg p.o. through stomach tube), $BrCCl_3$ produced 3 times as much lipoperoxidation in male Sprague-Dawley rats as did CCl_4. Rapid appearance of conjugated diene absorption in rats treated with a lethal dose of $BrCCl_3$ (1 ml/kg) suggested a positive correlation between massive lipoperoxidation of the hepatic endoplasmic reticulum and early death of the rat. Administration of a small dose of $BrCCl_3$ (0.025 ml/kg) caused a dramatic fall in liver microsomal cytochrome P-450. Rats with low levels of cytochrome P-450 due to pretreatment with $BrCCl_3$ were completely resistant to a lethal dose of CCl_4 (5 mg/kg). All rats given 1 ml/kg $BrCCl_3$ died within 2-6 hr. Such rapid death supports the suggestion that $BrCCl_3$ may have extrahepatic sites of action.

7503 AN EXAMINATION OF THE METABOLISM OF THIAMIN BY RAT LIVER ALCOHOL DEHYDROGENASE. *(E.)* Dalvi, R. R.; Sauberlich, H. E.; Neal, R. A. (Vanderbilt Univ. Sch. Med., Nashville, Tenn.). *J. Nutr.* 104(11):1476-1483, 1974.

Thiamin and its thiazole moiety, 5-(2-hydroxyethyl)-4-methylthiazole, were examined as substrates for purified rat liver alcohol dehydrogenase (RLADH). Although thiamin itself was a poor substrate for the enzyme, its thiazole moiety was oxidized at a faster rate than ethanol. With incubation times greater than 5 min, the major product of the *in vitro* reaction of the thiazole moiety of thiamin with RLADH was the corresponding acid, 4-methylthiazole-5-acetic acid (thiazole acetic acid). A possible mechanism is proposed for this RLADH-catalyzed 2-step oxidation of the thiazole moiety first to 4-methylthiazole-5-acetaldehyde followed by oxidation of the compound to thiazole acetic acid. *In vivo* administration of the RLADH inhibitor pyrazole (200 mg/kg i.p.) followed 30 min later by ^{35}S-thiamin (500 μg/kg) decreased the amount of thiamin excreted in urine as thiamin acetic acid and thiazole acetic acid. Pyrazole also had a significant effect on the rate of excretion of administered thiazole (100 mg/kg i.p.) as thiazole acetic acid. The data indicate that RLADH is involved in the *in vivo* metabolism of thiamin and its thiazole moiety to their corresponding acids.

7504 ALTERATIONS IN HEPATOCYTES AFTER MANIPULATION OF THE DIET: COPPER, ZINC AND CADMIUM INTERACTIONS. *(E.)* Miller, M. L.; Murthy, L.; Basom, C. R.; Petering, H. G. (Univ. Cincinnati, Coll. Med., Ohio). *Am. J. Anat.* 141(1):23-40, 1974.

Morphometric analyses of liver parenchymal cells were performed by electron microscopy on male albino rats fed a semipurified diet supplemented with copper and zinc. These metals were administered in demineralized drinking water to 4 groups of animals at 2 levels: (1) 0.25 μg Cu/ml, 2.5 μg Zn/ml, and (2) 1.0 μg Cu/ml, 10 μg Zn/ml. Cadmium, also administered in the drinking water daily to rats at 17.2 μg/ml, was given to 1 group of animals on each of the 2 semipurified diets. Two groups of rats were given laboratory chow plus 17.2 μg Cd/ml for 71 days and for 280 days. Volume densities of all organelles, as determined from micrographs, diminished significantly when levels of copper and zinc were lowest. Surface densities of rough and smooth endoplasmic reticulum were significantly decreased. Higher levels of copper and zinc produced morphologic and morphometric parameters which fell just below those obtained for rats fed chow. Glycogen accumulation was highest when the levels of metal were low. Lipid inclusions were more frequent with semipurified diets than with chow. Hepatocytes from rats fed the semipurified diet with low copper and zinc plus cadmium demonstrated a significant increase in smooth endoplasmic reticulum compared with animals fed the semipurified diet alone. The smooth endoplasmic reticulum changed little when cadmium was given to rats receiving adequate copper and zinc. Smooth endoplasmic reticulum increased when diets included chow and cadmium whereas rough endoplasmic reticulum decreased. Cup-shaped and elongated mitochondria with longitudinal cristae appeared in hepatocytes from animals fed chow with cadmium. These were not seen with semipurified diets and cadmium.

7505 DIETARY LIPID ASSIMILATION AFTER ACUTE ETHANOL INGESTION IN THE RAT. *(E.)* Mendenhall, C. L.; Greenberger, P. A.; Greenberger, J. C.; Julian, D. J. (Indiana Univ. Sch. Med., Indianapolis). *Am. J. Physiol.* 227(2):377-362, 1974.

The acute ingestion of ethanol (6 g/kg) preceeded by ingestion of a lipid emulsion containing tripalmitin-^{14}C resulted in the development of a fatty liver within 16 hr in male Holtzman rats maintained for 3 days previously on a fat-free diet. ^{14}C-Labeled liver triglycerides increased 4-fold, suggesting a substantial increase in the accumulation of dietary lipids. When the effect of ethanol on the amount of dietary lipids released into the circulation as chylomicrons was evaluated using thoracic duct cannulation, the tagged lipid recovered in the chyle after ethanol treatment was 2 times greater than the controls. When isolated intestinal mucosal cells were prepared from ethanol-treated animals, a significant increase in tagged lipid uptake was observed using either ^{14}C-palmitate or ^{14}C-monopalmitin. After 1 min incubation with ^{14}C-palmitate, the tagged fatty acids were recovered unesterified in the membrane fraction of the cells. The studies suggest that some, as yet undefined, ethanol-induced alteration in cell membrane is responsible for the observed changes.

7506 RETICULOENDOTHELIAL FUNCTION: DETERMINANT FOR SURVIVAL FOLLOWING HEPATIC ISCHEMIA IN THE BABOON. *(E.)* Olcay, I.; Holper, K.; Kitahama, A.; Miller, R. H.; Drapanas, T.; Trejo, R. A.; Di Luzio, N. R. (Tulane Univ. Sch. Med., New Orleans, La.). *Surgery* 74(4):643-653, 1974.

The influence of hepatic ischemia on reticuloendothelial function and on the development of systemic endotoxemia was evaluated and related to subsequent mortality patterns of *Papio papio* baboons. Hepatic ischemia was induced by total normothermic hepatic vascular occlusion. In 1 group of animals this was done without portacaval decompression. In the 2nd group, portacaval shunting was accomplished by interposition of a graft to accomplish an end-to-side anastomosis between the portal vein and inferior vena cava. Of 5 baboons undergoing 60 min of complete hepatic vascular occlusion without venous decompression, 60% manifested endotoxemia in both portal venous and femoral arterial plasma. All 3 animals undergoing 90 min of hepatic ischemia without venous decompression developed systemic endotoxemia. Of 4 animals undergoing 90 min of ischemia with venous decompression, 2 developed endotoxemia. Blood samples obtained from sham-operated and experimental animals prior to occlusion were endotoxin negative. The degree and persistence of endotoxemia did not appear to correlate with the ultimate fate of the animal. In contrast, reticuloendothelial dysfunction, as reflected by the impairment in the clearance of the ^{131}I-triolein reticuloendothelial test-lipid emulsion correlated with ultimate mortality patterns. Baboons which developed phagocytic depression 24 hr after hepatic insult ultimately died, while those which manifested minor modifications of reticuloendothelial function survived. These studies reveal that reticuloendothelial dysfunction may be contributory to fatal outcome in shock due to hepatic ischemia.

7507 THE TREATMENT OF CHRONIC LIVER DISEASE WITH D-PENICILLAMINE. *(E.)* Wildhirt, E. (Acad. Hosp., Kassel, Germany). *Postgrad. Med. J. (Suppl.)* 50(2):42-43, 1974.

The effects of penicillamine treatment (300 mg/day increasing to 1800 mg/day after 4 weeks) were studied in 78 patients with chronic liver disease who had not responded to a 3-month trial of corticosteroids or immunosuppressants. Biochemical parameters measured during treatment were serum bilirubin, total protein, immunoglobulins, aminotransferases, SGOT, SGPT, γ-glutamyl transpeptidase, and BSP. Biopsies were obtained at 6- to 12-month intervals. Four patients died of causes other than liver disease and 26 did not respond to treatment. In 30 patients all biochemical parameters normalized completely; in another 14 there was a marked reduction in transaminase activity, BSP, and immunoglobulin and γ-globulin levels. Histologic follow-up of 39 patients showed that 17 cases of chronic aggressive hepatitis or cirrhosis became inactive with disappearance of periportal cellular infiltrates and of Kupffer cell proliferation. The effect on inflammatory changes was good in another 20 patients. Side effects which necessitated discontinuation of treatment in 12 patients were rashes (4 cases), proteinuria (5), severe nausea (1), thrombocytopenia (1), and agranulocytosis (1). Ten other patients had further inflammatory exacerbations with an increase in transaminases. In contrast to azathioprine, there were no deaths in hepatic coma as a result of acute necrotic exacerbations. Unlike prednisone, which has a similar total incidence of side effects, penicillamine did not cause bleeding from a gastric ulcer, thromboembolism, or sepsis. However, a controlled trial of penicillamine treatment in chronic liver disease is needed. For the present the drug should be used only when other approaches have failed.

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7607 THE LIVER AND PHYSICAL EXERTION. *(Pol.)* Fojt, E. (Silesian Med. Acad., Katowice, Poland). *Pol. Arch. Med. Wewn.* 50(9):937-945, 1973.

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7613 EFFECT OF CORTISONE AND INSULIN ON ISOLATED PERFUSED CHICK LIVER. *(It.)* Ottolenghi, C.; Traniello, S.; Grazi, E. (Inst. Gen. Physiol., Univ. Ferrara, Italy). *Boll. Soc. Ital. Biol. Sper.* 49(18 bis):no. 43, 1973.

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7616 MORPHOFUNCTIONAL CORRELATIONS IN EXPERIMENTAL HEPATITIS TREATED WITH IMMUNOSUPPRESSANTS. *(Rum.)* Steflea, D.; Ionescu, N.; Cojocaru, V. (Inst. Med. Pharm., Bucharest, Rumania). *Fiziol. Norm. Patol.* 19(1):85-94, 1973.

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7618 SERUM ENZYME PATTERN IN EXPERIMENTAL ILEUM TRANSPLANTATION. *(Rus.)* Saburova, L. M.; Kurganskaia, N. N. (P. Lumumba Univ., Moscow, USSR). *Eksp. Khir. Anesteziol.* (3):33-38, 1973.

See also, 7351, 7356, 7357, 7406, 7413, 7462, 7643, 7940, 7950, 7990, 7991, 8003.

SECRETION AND METABOLISM

Intestine

7619 GASTRIN IN THE ONTOGENIC DEVELOPMENT OF THE SMALL INTESTINE. *(E.)* Lichtenberger, L.; Johnson, L. R. (V.A. Wadsworth Hosp. Ctr., Los Angeles, Calif.). *Am. J. Physiol.* 227(2):390-395, 1974.

Littermate King-Holtzman inbred cream-colored rats were used to determine the possible relation between observed antral gastrin increases during the beginning of weaning (3rd week of life) and major developmental changes in rat small intestinal development. Two litters of rats were used in 1 experiment, each litter being divided into 2 groups at 14 days of age; 1 group was prevented from weaning, while the 2nd group was allowed to wean. Rats were sacrificed 10 days later. The ratios of gut wet weight/body weight, RNA/body weight, and protein/body weight were significantly lower in nonweaned than weaned rats. Antral gastrin concentration was also significantly lower in nonweaned rats. In a following study, 250 μg/kg of pentagastrin or saline (for controls) was injected s.c. into 14-day-old rats which were prevented from weaning. Ten days of pentagastrin treatment significantly increased the gut weight/body weight, RNA/body weight, and protein/body weight ratios, and these increases were comparable to those seen after weaning. The findings demonstrate that pentagastrin has a trophic effect on intestinal structure of suckling rats and suggest that gastrin may be a mediator between the onset of weaning and the initiation of certain aspects of intestinal development. This role for gastrin is consistent with its well-established action as a gastrointestinal trophic agent and with the fact that the timing of its development coincides with weaning and major intestinal developmental changes.

7620 GASTRIC INHIBITORY POLYPEPTIDE (GIP) STIMULATION BY ORAL GLUCOSE IN MAN. *(E.)* Cataland, S.; Crockett, S. E.; Brown, J. C.; Mazzaferri, E. L. (Div. Endocrinol. Metab., Ohio State Univ., Columbus). *J. Clin. Endocrinol. Metab.* 39(2):223-228, 1974.

Serum levels of gastric inhibitory polypeptide (GIP), glucose, and immunoreactive insulin were measured in 25 normal subjects (19 men and 6 women, mean age 26.1 yr) receiving either p.o. (75 g) or i.v. (25 g) administrations of glucose. Mean serum glucose, immunoreactive insulin, and GIP levels of 21 subjects receiving glucose p.o. (peak at 30 min) were 132 mg/100 ml, 85 μU/ml, and 747 pg/ml, resp., as compared to mean fasting values of 73, 11, and 319, resp. Serum glucose and immunoreactive insulin tended to fall in parallel and returned to fasting levels by 180 min, while the serum GIP remained at peak up to 60 min and was still slightly above fasting level at 180 min. In 4 subjects receiving glucose i.v., glucose and insulin levels were 212 mg/100 ml and 32 μU/ml, resp., and peaked within 10 min, gradually returning to fasting levels by 50 min. However, fasting serum GIP (213 pg/ml) tended to fall by 10 min, was undetectable at 20, 30, and 40 min, and was 191 pg/ml at 50 min. Measurements of portal venous GIP, insulin, and glucose levels in response to p.o. glucose showed a prompt rise in GIP at 2 min when no increase in portal insulin was detectable. Portal GIP remained elevated until 180 min, whereas insulin increased by 5 min and remained slightly above fasting at 180 min. Unlike i.v. glucose which did not stimulate GIP release, p.o. glucose appears to be a potent stimulus for the enteric release of GIP. The mechanism of glucose-stimulated GIP release remains a subject for study.

7621 THE INFLUENCE OF SEROTONIN ON CRYPT CELL PROLIFERATION IN THE JEJUNUM OF RAT. *(E.)*

Tutton, P. J. M. (Dept. Anat., Monash Univ., Clayton, Victoria, Australia). *Virchows Arch.* [*Zellpathol.*] 16(1):79-87, 1974.

The influence of exogenous serotonin and of serotonin-depleting agents on jejunal crypt cell proliferation was studied in male rats aged 11-14 weeks, with estimates of cell proliferation being made between 1200 and 1600 hr to avoid circadian and gerontological variations in crypt cell proliferation. Two subgroups of rats were studied in each experiment: 1 subgroup used for cell cycle time studies was given i.p. injections of colchicine (0.1 mg/100 g) and killed after intervals of 1-4 hr; the 2nd subgroup used for estimating mitotic time did not receive colchicine injections. Small doses of serotonin (10 μg/kg i.p.) shortened crypt cell cycle time, whereas very large doses (300 mg/kg) prolonged both cell cycle time and mitotic time. Partial serotonin depletion following injection of 6-fluorotryptophan (1.5 mM/kg i.p.) retarded crypt cell cycle and mitotic time. The experimental results offer an explanation for elevated urinary levels of serotonin metabolites observed in patients with celiac disease. Increased cell proliferation observed in this disease may be mediated *via* an increase in the rate of serotonin from enterochromaffin cells of the small intestine.

7622 THE RESPONSES OF RAT INTESTINAL BRUSH BORDER AND CYTOSOL PEPTIDE HYDROLASE ACTIVITIES TO VARIATION IN DIETARY PROTEIN CONTENT: DIETARY REGULATION OF INTESTINAL PEPTIDE HYDROLASES.

(E.) Nicholson, J. A.; McCarthy, D. M.; Kim, Y. S. (VA Hosp., San Francisco, Calif.). *J. Clin. Invest.* 54(4):890-898, 1974.

The effects of variation in dietary protein content on small intestinal brush border and cytosol peptide hydrolase activities were investigated using male Wistar rats. One group of rats was fed a high protein diet (55% casein) and another was fed a low protein diet (10% casein). After 1 week, brush border peptide hydrolase activity was significantly greater in rats fed the high protein diet when data for corresponding segments were compared. No significant difference was seen in cytosol peptide hydrolase activity. In a second study, brush border and cytosol peptide hydrolase activities were determined in the proximal intestine as were sucrase, maltase, and alkaline phosphatase activities. As before, brush border peptide hydrolase activities were significantly greater in rats fed the high protein diet. However, activities of the nonproteolytic brush border enzymes did not vary significantly with diet. It is suggested that the brush border peptide hydrolase response to variation in dietary protein content represents a functional adaptation analogous to the regulation of intestinal disaccharidases by dietary carbohydrates.

7623 DIRECT MEASUREMENT OF GASTRIN RELEASE FROM DUODENUM AND JEJUNUM IN DOGS. *(E.)*

Becker, H. D.; Reeder, D. D.; Thompson, J. C. (Univ. Texas Med. Branch, Galveston). *Am. J. Physiol.* 227(4): 897-900, 1974.

The release of gastrin from the duodenum and jejunum of dogs stimulated by locally applied agents was investigated. Serum gastrin concentrations were measured directly by radioimmunoassay in the venous outflow draining the segment of intestine being studied. Perfusion of the proximal duodenum with 0.5% acetylcholine (Ach) pH 7.0, saline pH 7.0, or 0.4 M glycine pH 7.0 caused a significant release of gastrin. Perfusion of the distal duodenum with any of these agents did not cause a release of gastrin. Perfusion of the jejunum with 0.5% Ach pH 7.0 caused a prompt increase of serum gastrin concentration in the venous outflow. The gastrin concentrations achieved by perfusion of the jejunum with Ach, however, were about 70% lower than during perfusion of the proximal duodenum. The results provide evidence that the release of gastrin from the duodenum is pH dependent, since in all experiments lowering of pH caused an immediate decrease in levels of stimulated gastrin in the venous outflow. The results also suggest that Ach is a specific stimulus for the release of gastrin since there was no increase in serum cholecystokinin (as measured by radioimmunoassay).

7624 SUPPRESSOR CELLS IN THE RABBIT APPENDIX.

(E.) Kamin, R. M.; Henry, C.; Fudenberg, H. H. (Dept. Bacteriol. Immunol., Univ. California, Berkeley). *J. Immunol.* 113(4):1151-1161, 1974.

Rabbit appendix cells added to cultures of spleen cells, primed *in vivo* to sheep red blood cells, horse red blood cells, or azo-phenyl β-lactoside-keyhole limpet hemocyanin suppressed the secondary *in vitro* response of the spleen cells to the test antigen. Although suppression of both the IgG and IgM responses could be demonstrated when appendix cells were added at the onset of culture or 24 hr after culture initiation, suppression of the IgM response was less when appendix cells were added 48 hr after culture initiation. Two lines of evidence indicate that a T-cell population was involved in the suppression observed. Suppressor cell activity was also found in spleen and Peyer's patches. The observation that normal cell populations of appendix, spleen, and Peyer's patches were capable of suppressing the secondary *in vitro* response to azo-phenyl β-lactoside indicates a general rather than an antigen-specific suppression. It is proposed that the suppressor activity of the appendix may be a key function of this organ.

7625 X-RADIATION-INDUCED INTESTINAL LESIONS IN PROTEIN-DEFICIENT RATS. *(E.)* Deo, M. G.; Verma, K.; Ramalingaswami, V. (All-India Inst. Med. Sci., New Delhi). *Arch. Pathol.* 98(4):269-273, 1974.

Morphologic alterations in the jejunum following a single dose of 200 rads whole-body or 650 rads focal x-radiation to the abdomen were studied in protein-deficient rats and pair-fed controls. A similar study was also made in animals fed a stock diet but having weights similar to those of the protein-deficient animals at the time of x-radiation. A total of 133 young, male albino rats, weighing from 35 to 50 g, were used in the investigation. The protein-deficient animals showed less cellular degeneration, necrosis, and inflammatory response when compared with the controls. Recovery as judged by the rate of reappearance of mitoses was slow in the deficient animals. The jejunal crypts of the deficient animals contained a higher number of megalocytes when compared with the number found in the controls, following focal x-radiation. These observations suggest that higher susceptibility of the protein-deficient host is probably due to poor regeneration and not to increased sensitivity of the deficient tissues to x-radiation.

7626 A COMPARISON OF STOOL FLUID AND STOOL DIALYSATE OBTAINED IN VIVO. *(E.)* Tarlow, M. J.; Thom, H. (Dept. Child Hlth., Univ. Aberdeen, Scotland). *Gut* 15(8):608-613, 1974.

Stools were collected from 2 healthy adult volunteers who produced rather soft stools. Stool fluid was obtained by freezing and thawing, homogenization, and high-speed centrifugation. This fluid was compared with stool dialysate obtained *in vivo* from the same individuals by retrieval of swallowed dialysis bags from their stools. Stool fluid was more acidic, and had a higher osmolality, an increased concentration of organic anions, sugar and ammonia, and a lower bicarbonate concentration than dialysate *in vivo*. The difference in composition between stool fluid and stool dialysate cannot be accounted for by artifacts of the handling technique nor by continued fermentation of stool after passage. Therefore, it is suggested that in the individuals studied stool dialysate *in vivo* may not be in equilibrium with the stool fluid surrounding it and may not represent a true dialysate of the extracellular component of fecal water.

7627 NEURONAL AND MUSCULAR ACTIONS OF CYCLIC AMP (cAMP) AND DIBUTYRYLCYCLIC AMP (db cAMP) IN GUINEA PIG ILEUM AND VAS DEFERENS. *(E.)* Wikberg, J. (Sch. Med., Linkoping, Sweden). *Acta Pharmacol. Toxicol. [Suppl.] (Kbh.)* 35:56, 1974.

7628 NAPHTHOL METABOLISM: GLUCURONIDE CONJUGATION AND TRANSPORT BY THE RAT INTESTINE IN VITRO. *(E.)* Pekas, J. C. (USDA, ARS, Fargo, N.D.). *Toxicol. Appl. Pharmacol.* 29(3):404-419, 1974.

7629 THE IN VITRO EFFECT OF 17-β-ESTRADIOL ON RNA SYNTHESIS IN INTESTINAL CELL LINE I-407. *(E.)* Beaver, M.; Shaver, R. C.; Anderton, L. G. (No affil.). *J. Elisha Mitchell Sci. Soc.* 89(4):243-244, 1973.

7630 THE IN VITRO EFFECT OF VITAMIN A ON RNA SYNTHESIS IN AN INTESTINAL CELL LINE. *(E.)* Kelly, P.; Anderton, L. G.; Schauer, R. C. (No affil.). *J. Elisha Mitchell Sci. Soc.* 89(4):245, 1973.

7631 KINETIC EVIDENCE FOR THE PRESENCE OF TWO FORMS OF M_2-TYPE PYRUVATE KINASE IN RAT SMALL INTESTINE. *(E.)* Van Berkel, T. J. C.; de Jonge, H. R.; Koster, J. F.; Hulsmann, W. C. (Fac. Med., Erasmus Univ., Rotterdam, Netherlands). *Biochem. Biophys. Res. Commun.* 60(1):398-405, 1974.

7632 RELATIONSHIP OF CALCIUM UPTAKE AND CALCIUM-BINDING PROTEIN SYNTHESIS IN CHICK AND RAT INTESTINE IN RESPONSE TO Solanum Malacoxylon. *(E.)* Lawson, D. E. M.; Smith, M. W.; Wilson, P. W. (Dunn Nutr. Lab., Univ. Cambridge, England). *FEBS Lett.* 45(1):122-125, 1974.

7633 SOME BIOCHEMICAL CHARACTERISTICS OF A PROTEIN IN THE COLIC CONTENTS OF THE RABBIT WHICH INTERVENES IN THE LYSIS OF MICROORGANISMS DURING INTESTINAL TRANSIT. *(E.)* Raynaud, P.; Bonnafous, R. (Inst. Physiol., Toulouse, France). *Digestion* 10(3):238, 1974.

7634 SECRETION OF IgA INTO "ANTIGEN-FREE" ISOGRAFTS OF MOUSE SMALL INTESTINE. *(E.)* Ferguson, A. (Western Infirm., Glasgow, Scotland). *Clin. Exp. Immunol.* 17(4):691-696, 1974.

7635 SECRETION OF IMMUNOREACTIVE GASTRIN IN DUODENAL FLUID. *(E.)* Hansky, J.; Soveny, C.; Korman, M. G. (Monash Univ. Dept. Med., Melbourne, Australia). *Aust. NZ J. Med.* 4(3):302, 1974.

7636 HYDROCHLORIC ACID CLEARANCE AND ENDOTOXIN INDUCED DUODENAL EROSIONS IN DOGS. *(E.)* Greenberg, L.; Himal, H. S. (Dept. Surg., McGill Univ., Montreal, Canada). *Surg. Gynecol. Obstet.* 139(4):561-565, 1974.

7637 THE ROLE OF THE ILEOCECAL PART OF THE INTESTINE IN THE DEVELOPMENT OF COMPENSATORY REACTIONS AFTER EXTENSIVE RESECTION OF THE ILEUM. *(Rus.)* Seniutovich, V. F.; Genik, S. N.; Koshik, T. F. (Ivano-Frankovsk Med. Inst., USSR). *Eksp. Khir. Anesteziol.* (4):23-28, 1973.

7638 DYNAMIC RELATIONS BETWEEN THE ENTRY OF THIAMINE INTO THE INTESTINAL EPITHELIUM AND ITS ENDOCELLULAR PHOSPHORYLATION. *(It.)* Ferrari, G.; Zanarone, O.; Ventura, U.; Sciorelli, G.; Rindi, G. (Inst. Hum. Physiol., Univ. Pavia, Italy). *Boll. Soc. Ital. Biol. Sper.* 49(18 bis): no. 76, 1973.

See also, 7340, 7343, 7345, 7365, 7366, 7406, 7413, 7416, 7432, 7440, 7505, 7514, 7560, 7569, 7618.

GENERAL

7639 VASCULAR RESPONSIVENESS OF THE IN SITU PERFUSED DOG PANCREAS. *(E.)* Gorczynski, R. J.; Spath, Jr., J. A.; Lefer, A. M. (Univ. Virginia Sch. Med., Charlottesville). *Eur. J. Pharmacol.* 27 (1):68-77, 1974.

The dog pancreas, perfused *in situ*, was used to study: (1) the role of humoral vasoactive agents in maintaining pancreatic hypoperfusion in shock, (2) the mechanisms involved in the protective action of glucocorticoids in shock, and (3) pancreatic vascular response to ouabain. Close intra-arterial injection of norepinephrine (4 ng/ml), epinephrine (10 ng/ml), vasopressin (0.3 mU/ml), and angiotensin (5 ng/ml), concentrations present in animals with hemorrhagic shock, significantly increased pancreatic vascular resistance. Bradykinin (5 ng/ml), prostaglandin E_1 (30 ng/ml) and prostaglandin E_2 (75 ng/ml) exerted a vasodilator effect. The glucocorticoids, methylprednisolone (1 mg/kg intra-arterial, 30 mg/kg, i.v.) and dexamethasone (0.2 mg/kg intra-arterial and 8 mg/kg i.v.) were without net vascular effect in the perfused pancreas at these concentrations, which are comparable to those known to be protective in hemorrhagic shock. Ouabain (12.5 μg/kg) produced a persistent increase in pancreatic vascular resistance. These results indicate that the pancreas is responsive to vasoactive agents which are released in hemorrhage. The responsiveness to these agents is influenced by the blood flow to the organ. When blood flow is decreased, response to a vasoconstrictor is enhanced and response to a vasodilator is diminished. The failure of i.v. glucocorticoids to cause changes in the pancreatic perfusion pressure or systemic arterial pressure indicates that these glucocorticoids do not have a significant vasodilator action and suggests other mechanisms must be considered to explain their protective action in hemorrhagic shock. The ability of ouabain to produce vasoconstriction in the pancreatic vasculature suggests that ouabain might be used to treat shock states.

7640 GASTRIC MUCOSAL BLOOD FLOW MEASUREMENT. *(E.)* Sales, J.; Bickel, J.; Norton, L.; Eiseman, B. (Denver Gen. Hosp., Colorado). *J. Surg. Res.* 17(3):171-176, 1974.

Pertechnetate clearance by the stomach before and after betazole stimulation was compared to regional measurements of gastric blood flow utilizing ^{51}Cr- or ^{141}Ce-labeled microspheres in five piglets. Pertechnetate clearance closely correlated with mucosal blood flow in the gastric corpus measured by the microsphere technique. Betazole increased blood flow in the corpus region by 100% but did not alter this relationship. Except in one experiment, microsphere blood flow values in the antrum and fundus were unchanged by betazole and did not significantly correlate with pertechnetate clearance. Pertechnetate clearance appears to be a reliable method of determining gastric mucosal blood flow in experimental animals and may be considered as a noninvasive method for measuring such flow in humans.

7641 PHYSIOLOGIC MEASUREMENT OF INTRAHEPATIC SHUNTED BLOOD FLOW BY METHOD OF CONTINUOUS INFUSION OF D-GALACTOSE-1-C^{14}. *(E.)* Nakamura, S.; Sasaki, K.; Takezawa, Y.; Yoshida, G.; Sato, T. (Tohoku Univ. Sch. Med., Sendai, Japan). *Angiology* 25(7):484-489, 1974.

7642 REDISTRIBUTION OF LOCAL INTESTINAL BLOOD FLOW BY SECRETIN. *(E.)* Fara, J. W.; Madden, K. (Dept. Physiol., Biophys., State Univ. New York, Stony Brook). *Physiologist* 17(3):219, 1974.

7643 X-RADIATION-SENSITIVITY OF RAT LIVER TO INTERPHASE DEATH. *(E.)* Jackson, K. L.; Christensen, G. M.; Hebard, D. W.; Parker, R. G. (Univ. Washington, Div. Radiat. Biol., Seattle). *Radiat. Res.* 59(3):585-596, 1974.

7644 ENTEROTOXIN SYNTHESIS BY THE STAPHYLOCOCCI. *(E.)* Bergdoll, M. S.; Czop, J. K.; Gould, S. S. (Food Res. Inst., Univ. Wisconsin, Madison). *Ann. N.Y. Acad. Sci.* 236:307-316, 1974.

7645 DUODENAL JUICE RECOVERY DURING PANCREATIC FUNCTION TESTS. *(E.)* Bianchi, P.; Ranzi, T.; Bardella, M. T.; Bardi, U. (Med. Clin. I, Univ. Milan, Italy). *Rend. Gastroenterol.* 5(3):235, 1973.

7646 THE GASTROINTESTINAL HORMONES: A REVIEW OF RECENT ADVANCES. *(E.)* Gregory, R. A. (Physiol. Lab., Univ. Liverpool, England). *J. Physiol. (Lond.)* 241(1):1-32, 1974.

DIAGNOSTIC PROCEDURES

7647 PERORAL JEJUNAL MUCOSAL BIOPSY IN DERMATOLOGICAL AND SOME NON-DIARRHEAL DISEASES. *(E.)* Madanagopalan, N.; Shantha, M.; Rao, U. P.; Thambiah, A. S. (Madras Med. Coll., India). *Australas. J. Dermatol.* 14(1):47-52, 1973.

The dissection microscopic and light microscopic appearance of the jejunal mucosa in various dermatological disorders and in a few nondiarrheal diseases without significant alimentary symptoms were studied in biopsies. The dermatological disorders studied included psoriasis (14 cases), pemphigus (6), Darier's disease (5), scleroderma (2), and one case each of Bockhardt's impetigo and acne rosacea. Patients with nondiarrheal diseases included those with diabetes mellitus (7), chyluria (5), lymphoma (5), syphilis (2), Hurler's syndrome (1), and traumatic paraplegia (1). On dissection microscopy, mucosa was classified as Grade I, predominant fingers; Grade II, predominant leaves; Grade III, predominant convolutions, or Grade IV, flat. The appearance at light microscopy was classified as normal, partial villous atrophy, or subtotal villous atrophy. Of the 14 cases of psoriasis, predominant Grade III changes were observed in 9 and predominant Grade II changes in 5. No Grade IV changes were seen. In 10 cases of psoriasis, the light microscopic appearance was partial villous atrophy. The incidence of abnormalities in psoriasis was significantly higher than that of the other skin diseases studied; moreover, the incidence of Grade III changes was higher than that previously reported for diarrheal diseases in the local population (Madras). In nondiarrheal diseases, Grade III changes and partial villous atrophy each occurred in 3 cases of diabetes mellitus and 3 cases of lymphoma. In view of the extent of abnormal villous morphology in the local population, the mucosal abnormalities in these patients with skin disease may not be significant. However, patients with psoriasis are likely to show greater abnormalities than patients with other dermatological diseases.

7648 USEFULNESS OF SERIAL SERUM CARCINOEMBRYONIC ANTIGEN (CEA) DETERMINATIONS DURING ANTICANCER THERAPY OR LONG-TERM FOLLOWUP OF GASTROINTESTINAL CARCINOMA. *(E.)* Ravry, M.; Moertel, C. G.; Schutt, A. J.; Go, V. L. W. (Mayo Clin., Rochester, N.Y.). *Cancer* 34(4):1230-1234, 1974.

Serial measurements of carcinoembryonic antigen (CEA) were made on 30 asymptomatic, untreated patients (controls) with unresectable gastrointestinal cancer; on 57 symptomatic patients before and during chemotherapy for unresectable gastrointestinal cancer; and on 80 patients who had undergone resection for colorectal cancer. In 19 controls followed for a 20-day period, CEA values were elevated initially and showed day-to-day variations of ± 35%. In the 11 controls followed for 6 months, CEA was abnormal initially (>2.5 mg/ml) and rose progressively through the study period, the rise correlating with clinical evidence of progressive disease. Prechemotherapy CEA levels were abnormal in 42 patients. Thirteen (65%) of 20 who showed objective clinical progression had a corresponding increase in CEA, while 6 (75%) of 8 patients with objective improvement had a corresponding decrease in CEA. No change in serum CEA occurred in 8 clinically stable patients. Paradoxical reductions in CEA levels occurred in 4 patients approaching terminal status. In 15 patients CEA levels were normal prior to chemotherapy. In 4 with clinically progressive disease, CEA correspondingly rose to abnormal levels. However, CEA levels remained unchanged in 10 of the remaining 11 patients, including 4 with obvious progression of disease. Of the 80 patients followed after potentially curative resection of large intestine cancer, all had normal postoperative CEA levels. Six again have clinical evidence of malignant disease and in 5 of these there was a concurrent elevation of serum CEA. Serial serum CEA determinations apparently have some value for following the course of gastrointestinal cancer patients after surgery or chemotherapy, but these determinations must be interpreted in the context of the overall clinical picture.

7649 DEMONSTRATION OF PORTOCAVAL [SIC!] SHUNTS AND SUPERIOR MESENTERIC VENOUS COLLATERAL CHANNELS FOLLOWING SELECTIVE INTRA-ARTERIAL INJECTION OF VASODILATORS. *(E.)* Redman, H. C. (Wayne County Gen. Hosp., Eloise, Mich.). *Invest. Radiol.* 9(3): 199-204, 1974.

Vasodilators including bradykinin (1.0-10.9 mg), tolazoline (5-10 mg), eledoisin (0.5-5.0, 10.0 μg), epinephrine (2.0-6.0 μg), glucagon (5-20 μg), acetylcholine (0.5-1.0, 5 mg), meglumine diatrozoate (12 ml of a 76% solution), histamine (0.01-0.1 mg), and papaverine (10-60 mg) were selectively injected into the superior mesenteric artery in dogs with end-to-side portacaval shunts. Angiograms were performed before and after administration of the vasoactive drugs to show any changes in arterial, capillary, and venous phases. Bradykinin and glucagon caused the most improvement in venous visualization. Tolazoline and, to a lesser extent, meglumine diatrozoate, also consistently enhanced venous visualization. Eledoisin produced a moderate to marked improvement at the lower doses; the highest dose was associated with hypotension and decreased visualization. The remaining drugs caused a lesser, inconsistent response. Although unavailable for clinical use in the United States, bradykinin is the best drug for improving venous visualization in both dog and man. The improvement caused by bradykinin was associated with decrease in arterial detail, decreased aortic reflux, and early venous appearance. No systemic effects were noted.

7650 THE JOINT NATIONAL CANCER INSTITUTE OF CANADA/AMERICAN CANCER SOCIETY STUDY FOR CARCINOEMBRYONIC ANTIGEN (CEA). *(E.)* Miller, A. B. (Natl. Cancer Inst., Toronto, Canada). *Cancer* 34(3): 932-935, 1974.

The usefulness of testing for carcinoembryonic antigen (CEA) as a diagnostic procedure for cancer was evaluated in 503 patients, 146 of whom had cancer of the colon or rectum. Positive results (2.5 ng/ml CEA or more) occurred in 62% of the preoperative specimens from colorectal cancer patients. Of the patients with colorectal cancer, 58% of those with Dukes' B2 and C1 lesions and 83% of those with advanced lesions (C2) were positive for CEA. In contrast, the test was positive in only 28% of colorectal cancer patients with minimal lesions, Dukes' A and B1. This low positivity rate in patients with less advanced disease is a disappointing feature of the test. Positive results occurred in 53% of the specimens from patients with cancer elsewhere in the gastrointestinal tract as well as in the breast and lung, and in 29% of those with other diagnoses, usually gastrointestinal complaints. It is concluded that, although the test shows promise as a diagnostic aid for colorectal cancer, its lack of specificity precludes its use for screening.

7651 THE DOUBLE CONTRAST BARIUM MEAL -- A SIMPLIFICATION. *(E.)* O'Reilly, G. V. A.; Bryan, G. (Middlesex Hosp., London, England). *Br. J. Radiol.* 47(560):482-483, 1974.

7652 THE SIGNIFICANCE OF A PALPABLE LIVER. A CORRELATION OF CLINICAL AND RADIOISOTOPE STUDIES. *(E.)* Rosenfield, A. T.; Laufer, I.; Schneider, P. B. (Beth Israel Hosp., Boston, Mass.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 122(2): 313-317, 1974.

7653 SIMPLE METHOD TO ESTIMATE HEPATIC BILIRUBIN CLEARANCE: ITS APPLICATION IN THE DIFFERENTIAL DIAGNOSIS OF GILBERT'S DISEASE. *(E.)* Egger, G.; Kutz, K.; Bachofen, H.; Preisig, R. (Dept. Clin. Pharmacol., Univ. Berne, Switzerland). *Digestion* 10(3):225, 1974.

7654 COLONOSCOPY: A REPORT OF 644 CASES AND REVIEW OF THE LITERATURE. *(E.)* Sivak, Jr., M. V.; Sullivan, Jr., B. H.; Rankin, G. B. (Cleveland Clin. Fdn., Ohio). *Am. J. Surg.* 128(3): 351-357, 1974.

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7656 ENDOSCOPIC POLYPECTOMY. *(E.)* Nagy, G. S. (Roy. North Shore Hosp., Sydney, Australia). *Aust. N.Z. J. Med.* 4(3):306-307, 1974.

7657 CURRENT ASPECTS OF ULTRASONIC SCANNING OF THE PANCREAS. *(E.)* Burger, J.; Blauenstein, U. W. (Univ. Hosp., Basel, Switzerland). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 122(2):406-412, 1974.

7658 PANCREATIC SCANNING AS A DIAGNOSTIC TOOL IN THE DISTRICT GENERAL HOSPITAL. *(E.)* Spencer, A. M.; Patel, M. P.; Smits, B. J.; Williams, J. D. F. (Walsgrave Hosp., Coventry, England). *Br. Med. J.* 4(5937):153-156, 1974.

7659 DIETARY PREPARATION FOR ORAL CHOLECYSTOGRAPHY -- A CRITICAL REAPPRAISAL. *(E.)* Parkin, G. J. S. (Gen. Infirm., Leeds, England). *Br. J. Radiol.* 47(560):452-453, 1974.

7660 EFFECT OF CHOLESTYRAMINE ON TELAPAQUE ORAL CHOLECYSTOGRAPHY. *(E.)* Nelson, J. A. (V.A. Hosp., San Francisco, Calif.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 122(2): 333-334, 1974.

7661 DIAGNOSTIC POTENTIALS OF RADIOLOGICAL AND ESOPHAGOSCOPIC STUDIES OF THE ESOPHAGUS. *(Rus.)* Medvedeva, N. T.; Briskin, B. S.; Vints, A. R. (Moscow Med. Stomatol. Inst., USSR). *Vestn. Khir.* 112(3):41-46, 1974.

7662 EXFOLIATIVE CYTOLOGY OF THE ESOPHAGUS. *(Cz.)* Vilardell, F. (Santa Cruz San Pablo Hosp., Barcelona, Spain). *Cesk. Gastroenterol. Vyz.* 28(5):349-352, 1974.

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7665 DIFFERENTIAL DIAGNOSIS OF HYPERGASTRINEMIA IN PEPTIC ULCER. *(Ger.)* Fritsch, W. P.; Hausamen, T. U. (1st Med. Clin. A., Univ. Dusseldorf, Germany). *Dtsch. Med. Wochenschr.* 99(26):1412-1414, 1974.

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7669 PROBLEMS OF METHODOLOGY IN INVESTIGATION OF INTESTINAL ABSORPTION WITH RADIOACTIVE TRACERS. *(Rum.)* Jovin, G.; Gheorghescu, B.; Suseanu, T.; Vasilescu, F.; Nedea, M.; Aposteanu, G.; Runcan, V. (Gastroenterol. Ctr., Bucharest, Rumania). *Fiziol. Norm. Patol.* 19(1):57-66, 1973.

7670 COLONOSCOPY: PROCEDURE AND PREVIOUS EXPERIENCE. *(Ger.)* Spencer, R. J. (Mayo Clin., Rochester, Minn.). *Zentralbl. Chir.* 98(32): 1160-1163, 1973.

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7675 CYTOLOGICAL DIAGNOSIS OF PANCREATIC CANCER. *(Sp.)* Cabre-Fiol, V.; Vilardell, R. (Santa Cruz y San Pablo Hosp., Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 43(4):351-364, 1974.

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7678 ENZYME TESTS IN THE ASSESSMENT OF LIVER FUNCTION. *(Fr.)* Plomteux, G. (Med. Chem. Lab., Liege, Belgium). *Sem. Hop. Paris* 50(28):1921-1930, 1974.

7679 HEPATIC DYE EXCRETION AND PROBLEMS OF SETTING UP MODELS. *(Ger.)* Towe, J.; Brugmann, E. (Med. Clin., Univ. Rostock, Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 33(4/5):167-171, 1973.

7680 EXPERIENCE WITH DYE EXCRETION IN LIVER DISEASE, USING THE INDOCYANINE GREEN TEST. *(Cz.)* Wittman, I.; Jakob, M.; Huoranszki, F. (Janos Hosp., Budapest, Hungary). *Cesk. Gastroenterol. Vyz.* 28(3):195-200, 1974.

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7682 INTERPRETATION OF LAPAROSCOPIC LIVER FINDINGS. *(Ger.)* Belohlavek, D. (Med. Clin. Polyclin., Univ. Erlangen, Germany). *Fortschr. Med.* 91(19):816-818, 1973.

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7685 MULTIFACTOR DISCRIMINANT ANALYSIS IN THE DIAGNOSIS OF MEDICAL, SURGICAL, AND NEOPLASTIC JAUNDICE. *(Fr.)* Corfa, A.; Toulet, J. (Int. Hosp., Univ. Paris, France). *Sem. Hop. Paris* 50(28):1935-1945, 1974.

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7687 VALUE OF DETERMINING SERUM GUANASE ACTIVITY. *(Cz.)* Teichmann, V.; Hantzschel, O. (Clin. Int. Med., Univ. Rostock, Germany). *Cesk. Gastroenterol. Vyz.* 28(1):43-45, 1974.

7688 ESO-GASTRO-DUODENOSCOPY IN ACUTE GASTROINTESTINAL BLEEDING IN LIVER CIRRHOSIS. *(Fr.)* Peeters, J. P.; Cremer, M. (Brugmann Hosp., Univ. Brussels, Belgium). *Ann. Gastroenterol. Hepatol. (Paris)* 9(6):523-527, 1973.

7689 FIBEROPTIC ENDOSCOPY OF THE COMMON BILE DUCT. *(Ger.)* Wiendl, H. J.; Stotter, L. (Surg. Clin., Technical Univ., Munich, Germany). *Fortschr. Med.* 91(26):1020-1021, 1973.

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7691 PHARMACOLOGICAL INCREASE IN THE SENSITIVITY OF THE BIOASSAY FOR DIAGNOSING THE ZOLLINGER-ELLISON SYNDROME. *(Ger.)* Arendt, R.; Rohde, L. (Med. Clin., Univ. Rostock, Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 33(4/5):205-211, 1973.

7692 THE POSSIBILITY OF EARLY DIAGNOSIS OF GASTROINTESTINAL CANCER. *(Ger.)* Rosch, W. (Med. Clin. Polyclin., Univ. Erlangen, Germany). *Fortschr. Med.* 91(26):1009-1010, 1973.

7693 GASTROINTESTINAL LARGE-PARTICLE BIOPSY. *(Ger.)* Ottenjann, R.; Lux, G.; Elster, K.; Bartelheimer, W.; Jakob, G. (Munic. Hosp., Munich-Neuperlach, Germany). *Dtsch. Med. Wochenschr.* 99(26):1389-1391, 1974.

See also, 7447, 7720, 7721, 7739, 7772, 7813, 7830, 7882, 7898, 7920, 7923, 7926, 7929, 7946, 7947, 7954, 8007, 8024, 8038, 8046, 8050, 8087.

GASTROINTESTINAL DISEASES

ESOPHAGUS

7694 EPIDERMOLYSIS BULLOSA: GASTROINTESTINAL MANIFESTATIONS. *(E.)* Orlando, R. C.; Bozymski, E. M.; Briggaman, R. A.; Bream, C. A. (Univ. North Carolina Sch. Med., Chapel Hill). *Ann. Intern. Med.* 81:203-206, 1974.

Dysphagia and clinically apparent esophageal involvement were studied in association with epidermolysis bullosa dystrophica (recessive) in 8 patients (6 males and 2 females, aged 6-21 yr). In this group of 8, siblings of 3 families were afflicted with epidermolysis bullosa dystrophica, and only 1 patient had no affected siblings. The inheritance system was consistent with an autosomal recessive pattern. Dysphagia was the major esophageal symptom in all cases and had been present from 3-21 yr, with a mean of 11.25 yr. Blenderized diets alleviated the symptoms. Barium studies revealed 7 patients with esophageal strictures from 2 mm to 7 cm long; 4 strictures were located in the upper third of the esophagus, 2 in the middle third, and 1 involved the middle and lower third. Length of stricture did not correlate with duration of symptoms. One to 7 yr after their initial study, repeat esophagrams in 4 patients showed no changes in the strictures. Manometric and radiologic studies showed 4 patients with predisposition for gastrointestinal reflux. While 2 of the 4 had a history of heartburn and 2 had an incompetent lower esophageal sphincter, none had lower esophageal strictures. The 1 patient with such a stricture had no heartburn and a negative study for reflux. Thus, the findings do not support the concept that strictures in the lower third of the esophagus reflect increased mucosal damage from reflux of gastric acid. Trauma may be a factor in lower as well as in upper esophageal strictures. Constipation with fecal impaction was a significant problem in 7 patients with dermolysis bullosa dystrophica (recessive). Since the symptoms and strictures were not progressive, conservative management of patients with dysphagia is advocated.

7695 MEASUREMENT OF PRESSURE IN THE LOWER ESOPHAGEAL SPHINCTER: THE INFLUENCE OF CATHETER DIAMETER. *(E.)* Kaye, M. D.; Showalter, J. P. (Univ. Vermont Med. Coll., Burlington). *Am. J. Dig. Dis.* 19(9):860-863, 1974.

Manometric assessments of the lower esophageal sphincter (LES) were performed on 10 healthy individuals (9 male and 1 female, mean age 28.7 yr) with two separate perfused catheter systems differing only in their external diameters (3.2 *versus* 7 mm) to assess the relation between catheter diameter and the LES functions of maximum resting pressure and relaxation in response to deglutition. Continuous pull-through measurement of maximum resting pressures was 17.7 ± 5.6 mm Hg for the large catheter compared with 12.5 ± 4.3 mm Hg for the smaller catheter. End-expiratory, end inspiratory, and mid-respiratory station withdrawal measurements with the large catheter were 14.3 ± 6.6, 17.9 ± 8.3, and 16.1 ± 7.2, resp., compared with 9.6 ± 3.6, 12.6 ± 4.7, and 11.1 ± 4.0 for the small catheter. Residual pressures during postdeglutitive relaxation were similar with the two systems. The observations show that LES pressures recorded with perfused catheters are in fact measurements of the resistance to stretch of sphincteric smooth muscle. In situations where relaxation of the sphincter is not normal, e.g., achalasia, the degree of relaxation recorded might well decrease as catheter size increases.

7696 GASTRIC ALKALINIZATION: EFFECT ON LOWER-ESOPHAGEAL-SPHINCTER PRESSURE AND SERUM GASTRIN. *(E.)* Higgs, R. H.; Smyth, R. D.; Castell, D. O. (U.S. Naval Hosp., Philadelphia, Pa.). *N. Engl. J. Med.* 291(10):486-490, 1974.

The increase in lower esophageal sphincter pressure after gastric alkalinization has been attributed to endogenous gastrin release. The sphincter response to 4 different alkalinizing agents and serum gastrin levels were compared in 10 normal men (aged 19-35 yr); the agents were sodium bicarbonate (3.4 g), calcium carbonate (2.0 g), magnesium hydroxide and aluminum hydroxide (15 ml), and magnesium hydroxide and aluminum hydroxide combined with calcium carbonate (11 ml). In addition, calcium carbonate (2.0 g) was given to 5 men (aged 23-41 yr) with peptic ulcer disease. In the 10 normal subjects, the serum gastrin levels did not change significantly in response to gastric alkalinization, despite increases in sphincter pressure. The serum gastrin levels and lower esophageal sphincter pressure decreased after 30 min of gastric acidification (0.1 *N* hydrochloric acid). Although the pressure increased with subsequent gastric alkalinization, the serum gastrin levels did not change from the depressed postacidification levels. In the five patients with peptic ulcer disease, calcium carbonate increased sphincter pressure at a time when the serum gastrin levels were unchanged. When the serum gastrin levels did increase, the sphincter pressure returned to basal levels. The data confirm the elevating effect of gastric alkalinization on the sphincter pressure, but suggest that endogenous gastrin release has little, if any, role in this response.

7697 MEASUREMENTS AND COMPARISONS OF LOWER ESOPHAGEAL SPHINCTER PRESSURES AND SERUM GASTRIN LEVELS IN PATIENTS WITH GASTROESOPHAGEAL REFLUX. *(E.)* Farrell, R. L.; Castell, D. O.; McGuigan, J. E. (Univ. Florida Coll. Med., Gainesville). *Gastroenterology* 67(3):415-422, 1974.

Serum gastrin levels and lower esophageal sphincter pressures were studied in 10 normal men (aged 20-73 yr) and in 12 patients (10 men and 2 women, aged 19-75 yr) with symptoms and radiographic evidence of chronic gastroesophageal reflux. Following ingestion of a 100-g lean roast beef meal, mean lower esophageal sphincter pressure increased in both control and symptomatic patients, but the rate of increase and the peak pressure were consistently significantly less in reflux patients. Mean serum gastrin levels showed a similar pattern of transient increase, reaching a peak in both groups after 30-45 min, but being significantly higher in control patients only after 45 min. Mean lower esophageal sphincter pressures and mean serum gastrin levels in control and reflux patients showed a significant decrease from basal levels following gastric acidification as well as a significant increase following alkalinization. At all times, sphincter pressure and serum gastrin levels were less in the reflux group than in the control group. Sphincter pressure increases following i.v. pentagastrin infusion were significantly greater in control subjects compared with reflux patients. These results suggest a role for gastrin deficiency in the incompetent lower esophageal sphincter.

7698 HYPOGASTRINEMIA IN PATIENTS WITH LOWER ESOPHAGEAL SPHINCTER INCOMPETENCE. *(E.)* Lipshutz, W. H.; Gaskins, R. D.; Lukash, W. M.; Sode, J. (Natl. Naval Med. Ctr., Bethesda, Md.). *Gastroenterology* 67(3):423-427, 1974.

The effect of gastric alkalinization and gastric instillation of glycine on lower esophageal sphincter pressure was studied in 9 patients with and 8 patients without symptomatic gastroesophageal reflux. Gastric acidity was titrated to pH 4 to 6 with 0.1 N NaOH; 1.5% glycine (180 ml) was then infused intragastrically at a rate of 30 ml/min. Serum gastrin levels were monitored periodically by radioimmunoassay and lower esophageal sphincter pressures were correlated. In normal subjects, lower esophageal sphincter pressure increased, following infusion of alkali and glycine, to 200% of the basal pressure. Sphincter pressure in symptomatic patients increased by only 36%. Mean fasting serum gastrin levels were decreased in patients with reflux. Peak serum gastrin levels following alkali and glycine infusion were over 2 times as high in normal subjects compared with symptomatic patients. These results lend support to the concept that gastrin is an important determinant of lower esophageal sphincter pressure, and suggest that hypogastrinemia may contribute to the pathogenesis of lower esophageal sphincter incompetence in humans.

7699 CORRELATION BETWEEN A PHYSIOLOGICAL TEST OF GASTRO-OESOPHAGEAL REFLUX AND SPHINCTER SQUEEZE. *(E.)* Stanciu, C.; Bennett, J. R. (Hull Roy. Infirm., Kingston upon Hull, England). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 131-138.

Symptoms of gastroesophageal reflux, measured by lower esophageal pH over a 15-hr period, and lower esophageal sphincter pressure, measured by a catheter perfusion technique, were studied in 42 normal subjects and 200 patients with symptoms of gastroesophageal reflux. Mean resting end-expiratory sphincter pressure of normal subjects was 18.0 ± 7.3 cm H_2O and was significantly higher than that of the patients with reflux symptoms (12.2 ± 7.9 cm H_2O). Reflux (i.e., decreased intraesophageal pH) correlated with reflux symptoms. There was, however, no correlation between sphincter pressure and the number of reflux episodes, between sphincter pressure and mean duration of reflux episodes, or between sphincter pressure and the length of time in which esophageal pH was less than pH 5, 4, or 3. Thus, pH studies appear to be more reliable and reproducible than measurements of sphincter pressure in assessing gastroesophageal reflux.

7700 GASTRIN AND GASTROESOPHAGEAL SPHINCTER INCOMPETENCE. *(E.)* Kun, T. L.; Sturdevant, R. A. L. (Wadsworth Hosp., Los Angeles, Calif.). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 125-130.

Gastroesophageal or lower esophageal sphincter (LES) pressure was studied by manometry in the resting state and after graded i.v. doses of pentagastrin (0.1 to 0.8 μg/kg at 10 min intervals) in 10 patients with gastroesophageal reflux and in 21 control subjects. Mean basal LES pressure and peak LES pressure response to pentagastrin in the reflux patients was significantly lower than in the control subjects. Mean basal and peak meal-stimulated serum gastrin levels, were not significantly different in 8 of 10 reflux patients compared with 7 of the 21 normal subjects. These data do not support the hypothesis that the basic pathophysiological mechanism of low LES pressure in reflux patients is decreased serum gastrin.

7701 THE PROBABILITY OF SYMPTOMS OR OF RADIOGRAPHIC EVIDENCE OF REFLUX PREDICTED BY LOWER OESOPHAGEAL SPHINCTER PRESSURE. *(E.)* Dilawari, J. B.; Edwards, D. A. W.; Girmes, D. H. (Central Middlesex Hosp., London, England). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 441-448.

The possible role of lower esophageal sphincter (LES) pressure as a predictor of the probability of symptoms or the presence of radiographic reflux was investigated by perfusion manometry in 246 subjects. Each of 4 tubes recorded a different pressure profile of the sphincter, apparently related to orientation of the side hole. Maximum sphincter pressure recorded by each tube was different, enabling calculation of sphincter pressure by 6 methods. Subjects with radiographic reflux had the same distribution of LES pressures as those without reflux, except that no reflux was seen in subjects with pressures above 18 mm Hg, which may represent the upper limit of challenge to the sphincter during the radiographic examination. The subjects without radiographic reflux, but with LES pressures below this critical level, must have had an additional anti-reflux mechanism. The difference in pressure between esophagus and fundus, recorded by a differential manometer during radiographic examination, was about 10 mm Hg. The frequencies of pressures appeared to fit log normal better than normal distributions. The probability of symptoms, deduced from the LES pressure, was unhelpful in diagnosis or management because of the considerable overlap in the distributions.

7702 PRIMARY DISORDERED MOTOR ACTIVITY OF THE ESOPHAGUS (DIFFUSE SPASM). DIAGNOSIS AND TREATMENT. *(E.)* Henderson, R. D.; Ho, C. S.; Davidson, J. W. (Univ. Toronto Fac. Med., Canada). *Ann. Thorac. Surg.* 18(4):327-336, 1974.

To delineate the diagnostic features of primary disordered motor activity (PDMA) of the esophagus, 21 patients with the disorder were studied clinically, roentgenographically, manometrically, and by esophagoscopy. All patients reported pain; dysphagia was present in 20; and weight loss occurred in 12. At the initial roentgenographic examination, the diagnosis of PDMA was made in only 5 patients. In a retrospective review of all high-quality roentgenograms, a specific diagnosis was possible in 8 of 11 patients on the basis of a combination of mural thickness and motor spasm. Manometry showed a very severe motor disorder in the lower 2/3 of the esophagus and, in conjunction with clinical and roentgenographic features, enabled a specific preoperative diagnosis to be made in 17 of the 21 patients. In 2 patients the misdiagnosis of associated hiatal hernia was corrected at operation by the finding of marked esophageal muscular hyperplasia and spasm. These pathological features were found in all patients at operation. In 2 patients with a food-retaining esophagus, preoperative manometry could not distinguish between achalasia and PDMA. Postoperative manometry made the distinction possible as proximal esophageal peristalsis was more recognizable. A myotomy from the stomach to 10 cm above the aortic arch was performed, but addition of a Collis gastroplasty was necessary to control reflux. With this approach 19 of 21 patients have been free of pain and dysphagia for 3-45 months.

7703 NORMAL LOWER-ESOPHAGEAL-SPHINCTER FUNCTION AFTER SURGICAL TREATMENT OF GASTROESOPHAGEAL REFLUX. *(E.)*

Lipshutz, W. H.; Eckert, R. J.; Gaskins, R. D.; Blanton, D. E.; Lukash, W. M. (Natl. Navy Med. Ctr., Bethesda, Md.). *N. Engl. J. Med.* 291(21):1107-1110, 1974.

To evaluate operations for gastroesophageal reflux, findings in 8 patients who underwent the Hill transabdominal gastropexy were compared with those in 7 patients who underwent the Belsey Mark IV transthoracic repair. Of the 15 patients, 12 had hiatus hernia, 11 free gastroesophageal reflux of barium, and 10 peptic esophagitis. Two months to 4 yr after surgery all but 1 of these abnormalities disappeared in 14 patients, who were also asymptomatic. Lower esophageal sphincter pressure increased from 5.4 ± 0.4 mm Hg to 16.5 ± 1.0 after the Hill repair and to 12.12 ± 1.3 after the Belsey repair. The difference between the preoperative and postoperative values was highly significant. Similar improvement marked the response to abdominal compression; peak sphincter response to pentagastrin (0.5 μg/kg i.v.) increased from 17.2 ± 3.7 mm Hg to 35.5 ± 2.9 after the Hill repair and 41.7 ± 7.9 after the Belsey repair. The differences between pre- and postoperative values were significant. Both operations resulted in clinical improvement and lower esophageal sphincter function that appeared essentially normal.

7704 ENZYME AND ULTRASTRUCTURAL CHARACTERISTICS OF ESOPHAGEAL COLUMNAR EPITHELIUM. *(E.)*

Berenson, M. M.; Herbst, J. J.; Freston, J. W. (Univ. Utah Med. Ctr., Salt Lake City). *Am. J. Dig. Dis.* 19(10):895-907, 1974.

A unique columnar epithelium with elaborate microvilli, secretory granules, and inability to absorb lipid lines the distal esophagus in many patients with midesophageal stricture. To clarify the nature and derivation of this epithelium, specimens from 3 patients with midesophageal stricture and 1 with an esophageal (Barret's) ulcer were studied by electron microscopy, enzyme histochemistry, and specific disaccharidase assay. The ultrastructure of the columnar epithelium was similar in all 4 patients. The principal cells had well-developed microvilli on the apical surface with a glycocalyx and incompletely formed terminal webs. Intercellular spaces between the lateral borders of many of these cells were greatly distended with a floccular material. Spherical bodies were interspersed between the microvilli; spherical and ellipsoid secretory granules were present in the apical cytoplasm. The secretory granules were homogenous, stippled, and unevenly dense. The epithelial tissue lacked disaccharidase activity. Membrane-related enzymes (alkaline phosphatase, glucose-6-phosphatase, and leucine aminopeptidase) located primarily on the brush border and lysosomal-membrane enzymes (acid phosphatase and 5-nucleotidase) were substantially less than in normal intestine but more active than in gastric tissue. The dissociation of structural and functional characteristics suggest a metaplastic derivation of this tissue.

7705 THE PATTERN OF BILE SALT REFLUX AND ACID SECRETION IN SLIDING HIATAL HERNIA. *(E.)*

Crumplin, M. K. H.; Stol, D. W.; Murphy, G. M.; Collis, J. L. (Queen Elizabeth Hosp., Birmingham, England). *Br. J. Surg.* 61(8):611-616, 1974.

The role played by gastric fluid refluxed from the stomach into the esophagus of 23 patients with symptomatic sliding hiatal hernia was evaluated in terms of gastric bile salt concentration and acid secretion rate. The patients included 13 with heartburn and esophagitis and 10 with a peptic stricture. Basal acid output was significantly higher in patients with a peptic stricture than in 15 controls. Approximately 1/2 of both hiatal hernia groups had periods of increased bile salt concentrations while fasting or following a test meal. This would indicate abnormal pyloric function in these patients. No unusual conjugates or free bile acids were detected in individual bile salt studies. The glycine/taurine conjugate ratio was markedly reduced in samples with a pH less than 4.5 compared with the ratio in duodenal bile with a normal alkaline pH. Since the stricture group had a substantial basal acid output in view of the mean age of the group (63.5 ± yr), it is postulated gastric acid pepsin and taurine conjugates bathe the lower end of the esophagus at night and between meals. The esophageal mucosa of these patients could be unduly sensitive to this combination. Increased pyloric reflux in approximately 1/2 the hiatal hernia patients suggests that a combination of gastric acid pepsin and bile is a major factor in the pathogenesis of the clinical responses to gastroesophageal reflux. Neither total nor individual bile salt concentrations in gastric juice helped to differentiate between the responses seen in symptomatic sliding hiatal hernia.

ESOPHAGUS

7706 APPEARANCE OF THE DISTAL ESOPHAGUS FOLLOWING PNEUMATIC DILATION. *(E.)* Brady, P. G.; Milligan, F. D. (Johns Hopkins Hosp., Baltimore, Md.). *Gastrointest. Endosc.* 21(1):30-31, 1974.

7707 INTRAMURAL OESOPHAGEAL DIVERTICULOSIS: A CORRELATION OF RADIOLOGICAL AND PATHOLOGICAL FINDINGS. *(E.)* Wightman, A. J. A.; Wright, E. A. (King's Coll. Hosp., London, England). *Br. J. Radiol.* 47(560):496-498, 1974.

7708 MANOMETRIC STUDIES ON PATIENTS WITH ESOPHAGEAL DIVERTICULA. *(Sp.)* Uribe, J. P.; Csendes, J. A.; Espinoza, M. J. (J. J. Aguirre Hosp., Univ. Chile, Santiago). *Rev. Clin. Esp.* 129(6):573-578, 1973.

7709 PATHOLOGICAL BIOLOGY, CLINICAL SYMPTOMS, AND TREATMENT OF ACHALASIA. *(Ger.)* Wenzel, K. P. (Surg. Clin. Polyclin., Martin Luther Univ., Halle-Wittenberg, Germany). *Z. Aerztl. Fortbild.* 67(21): 1092-1095, 1973.

7710 A CASE OF EARLY ESOPHAGEAL CARCINOMA. *(Jap.)* Kakuta, H.; Fukushima, M.; Chiba, K.; Fukuda, S.; Nagano, S. (Hirosaki Univ. Sch. Med., Japan). *Jap. J. Cancer Clin.* 19(12):1190-1192, 1973.

7711 PRIMARY MELANOMA OF THE ESOPHAGUS. *(E.)* Musher, D. R.; Lindner, A. E. (New York Univ. Sch. Med., New York). *Am. J. Dig. Dis.* 19(9): 855-859, 1974.

7712 LYMPHOSARCOMA OF THE ESOPHAGUS: A CASE REPORT. *(E.)* Nissan, S.; Bar-Moar, J. A.; Levy, E. (Centr. Emek Hosp., Afula, Israel). *Cancer* 34(4):1321-1323, 1974.

7713 RADIOTHERAPY OF CARCINOMA OF THE OESOPHAGUS. *(E.)* Ross, W. M. (Newcastle Gen. Hosp., Newcastle upon Tyne, England). *Proc. R. Soc. Med.* 67(5): 395-398, 1974.

7714 THE SURGICAL TREATMENT OF CARCINOMA OF THE OESOPHAGUS. *(E.)* McKeown, K. C. (Darlington Mem. Hosp., Northallerton, England). *Proc. R. Soc. Med.* 67(5):389-395, 1974.

See also, 7363, 7661, 7662, 7671, 7692, 7778, 7799, 7844.

STOMACH

7715 ARE PEPSINOGENS ACTIVATED IN GASTRIC MUCOSA AFTER ASPIRIN-INDUCED INJURY? *(E.)* Mangla, J. C.; Kim, Y. M.; Turner, M. D. (Monroe Community Hosp., Rochester, N.Y.). *Experientia* 30(7): 727-729, 1974.

The possibility that pepsinogens in gastric mucosa are activated to pepsins after aspirin-induced injury was investigated in 20 male Holtzman rats given a single i.m. injection of aspirin (600 mg/kg) suspended in 1% methyl cellulose. From 5-15 mucosal erosions were seen in animals sacrificed 1 hr later; at 2 hr there were 10-25 erosions and at 3 hr, 10-30. Agar gel electrophoresis for the simultaneous demonstration of pepsinogens and pepsins in mucosal homogenates showed no differences in patterns in 1-3 hr samples from the 20 experimental and the 20 control animals. Thus, there was no evidence of *in vivo* activation of pepsinogens to pepsins. On agar gel electrophoresis at pH 5.7, mucosal homogenates from normal and aspirin-treated rats showed 4 major bands of proteolytic activity. After normal mucosal homogenates were acidified *in vitro* with 0.2 N HCl, the 4 bands were replaced by 3 bands of proteolytic activity with markedly enhanced mobility. None of the 20 mucosal homogenates from experimental animals showed 3 bands of proteolytic activity corresponding in mobility to the bands in the *in vitro* acidified mucosa. Incubation of normal mucosa in unbuffered aspirin resulted in proteolytic activity similar to that observed after treatment of the mucosa with HCl. Electrophoresis of acid activated mucosal homogenates at pH 8.3 gave only 1 band of residual proteolytic activity, the other 2 bands having been destroyed by the high pH. On electrophoresis at pH 8.3, mucosal homogenates from rats with aspirin-induced erosions still showed the 4 major bands of proteolytic activity, indicating that the bands were due to the presence of zymogens. One of the 4 zymogens may resemble the zymogen of human gastric mucosal cathepsin which is resistant to destruction on acid activation and subsequent neutralization. The results indicate that rat pepsinogens differ from human gastric mucosal pepsinogens. Unlike human pepsinogens, which did not coagulate milk even after 2 min, rat pepsinogens coagulated milk after 2 min of incubation. However, the disappearance of 2 components from the mucosal homogenates confirmed that acidification of the pepsinogens resulted in their activation to pepsins.

7716 THE DISTRIBUTION OF GASTRITIS IN CARCINOMA OF THE STOMACH. *(E.)* Du Plessis, D. J. (Johannesburg Hosp., South Africa). *Br. J. Surg.* 61(7):521-523, 1974.

Using the Swiss-roll technique, histological studies of the wall structure were performed on stomachs resected from 21 patients with carcinoma. Chronic gastritis with epithelial hyperplasia was present in all cases. The distribution of chronic gastritis varied and 2 types were clearly recognizable. In 17 cases, chronic gastritis extended continuously from the pylorus up to or beyond the carcinoma and in some cases involved the entire resected stomach. This type of gastritis could be due to reflux of duodenal contents into the stomach. Intestinal metaplasia was present in all 17 cases, and the carcinoma was in the distal part of the stomach in 14. In 4 stomachs, gastritis occurred in the vicinity of the carcinoma only, with no extension to the pylorus, and therefore could not be the result of duodenal reflux. Intestinal metaplasia was present in 2 of these 4 cases, and the carcinoma was in the distal stomach in 2. Two types of carcinoma of the stomach are postulated. One type is associated with the epithelial hyperplasia of chronic gastritis, possibly resulting from duodenal reflux. The other is also associated with chronic gastritis, but the cause of the gastritis is unknown.

7717 GASTRIC MOTILITY AND SERUM GASTRIN LEVELS IN CHRONIC ATROPHIC GASTRITIS. *(E.)*

Barbara, L.; Bortolotti, M.; Vezzadini, P.; Miglioli, M.; Labo, G. (1st Inst. Med. Pathol., Univ. Bologna, Italy). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 153-164.

Studies to determine gastric emptying time and the myoelectrical and mechanical activity of the gastric antrum were conducted on 15 patients with chronic atrophic gastritis with hypergastrinemia (immunoreactive gastrin > 500 pg/ml), on 7 patients with chronic atrophic gastritis with normal or low serum gastrin levels (< 80 pg/ml), and on 9 normal subjects. In the first group with hypergastrinemia, gastric emptying time, basic electric rhythm (slow wave) frequency, and percent motor activity were significantly greater than these parameters in normal persons. Motility index (percent motor activity X mean wave amplitude) and mean wave amplitude were normal. In hypogastrinemic patients, gastric emptying time, basic electric rhythm, and percent motor activity were normal whereas motility index and mean wave amplitude were significantly less than normal. Radiologic studies confirmed normal peristaltic activity in hypergastrinemic patients and weak peristaltic waves in 4 of the 6 hypogastrinemia patients. Since the electrical and mechanical parameters of hypergastrinemic patients were similar to those seen during gastrin administration, which delays gastric emptying, it is felt that high serum gastrin levels may be involved in the delayed gastric emptying under these circumstances.

7718 GASTRIC CANCER IN AMERICAN NEGROES. *(E.)*

Kovi, J.; Viola, M. V.; Connolly, C. A.; Vohra, R. (Howard Univ. Coll. Med., Washington, D.C.). *Cancer* 34(3):765-770, 1974.

A retrospective study was conducted of 150 consecutive black patients (110 men and 40 women, aged 25-87 yr) with histologically confirmed gastric carcinoma. The most common presenting symptoms and the percentages of patients in whom they appeared were: pain (65.3%), weight loss (59.3%), cachexia (52.0%), vomiting (41.3%), anorexia (39.3%), nausea (22.0%), malaise (14.0%), early satiety (14.0%), epigastric mass (10.0%), Virchow's node (5.3%), and rectal shelf (2.0%). Associated gastrointestinal diseases included peptic ulcer (12 cases), second primary cancer of the colon or bladder (1 each), gastric polyps (4 cases), and pancreatitis (2). An upper gastrointestinal roentgenographic examination was performed on 82 patients and gave a positive diagnosis of cancer in 85.4% of the cases, indicating the advanced state of many of the cases in this series. Analysis of fasting gastric contents in 34 patients showed that in 94.1% free hydrochloric acid was absent or low and in 5.9% normochlorhydria was present. None of the patients had a history of pernicious anemia. In contrast to an excess of blood group A observed in predominantly white series, the black patients with gastric cancer had an excess of blood group B. In both males and females, diffuse carcinoma was predominant in the younger age groups. With advancing age, the incidence of well-differentiated adenocarcinoma significantly increased in both sexes. Surgical procedures included subtotal gastrectomy (34 patients), radical subtotal gastrectomy (40), total gastrectomy (10), bypass gastrojejunostomy (12), gastrostomy (5). The operability rate was 72.1% and the operative mortality was 18.8%. Median survival time according to the TNM staging system for patients with Stage I disease was 30 months; for Stage II, 12 months; Stage III, 3.5 months; and Stage IV, 2 months. The survival of black patients in each stage of disease was considerably poorer than for comparable white patients.

7719 STANDARDIZATION OF ELECTROSURGICAL LESIONS. *(E.)*

Blackwood, W. D.; Silvis, S. E. (Texas Tech. Univ. Sch. Med., Lubbock). *Gastrointest. Endosc.* 21(1):22-24, 1974.

An attempt was made to control the depth of tissue necrosis in the canine stomach by controlling amperage and application times of electrosurgical currents. The coagulation technique employed on 43 dogs consisted of passing a 2-mm round electrode tip through an Olympus GE-BK fibergastroscope, placed against the gastric mucosa under direct vision, and applying a bipolar radio-frequency current. A single lesion resulted from one current application. A double lesion resulted from two identical current applications, with the second superimposed on the first or at the edge of the initial lesion. A 1-cm lesion was obtained through multiple applications of current. The single application in the range of 400-425 mA for 1.0-1.5 sec caused mucosal necrosis with little or no muscle necrosis. Significantly increased muscle necrosis resulted from prolonging the time to 2.0 sec or increasing the current to 500 mA. Repeating the current application in the same or immediately adjacent location increased the depth of necrosis by 70-80%. Ulcers of about 1 cm diameter showed the least muscular necrosis with 1 sec applications of currents between 350 and 400 mA. Shortening the duration with a maximal power setting produced increased muscle necrosis even at the shortest interval tested, 0.4 sec. These results verify the difficulties in standardizing electrosurgical technics. The total power converted to heat is the ultimate determinant of the amount of tissue necrosis. Electrode contact is a major problem as are the changes caused in tissues by heating which result in changes in resistance and thus in current flow. It is advisable to maintain the current below 400 mA with applications of 1 sec or to set the coagulator at a moderate level and visually control the size of the coagulated area to 2-2.5 mm for each application. Data in this study apply only to the use of a 2-mm rounded electrode tip applied to a flat mucosal surface.

7720 POST-OPERATIVE GASTRIC ELECTRICAL CONTROL ACTIVITY (ECA) IN MAN.

(E.) Sarna, S. K.; Bowes, K. L.; Daniel, E. E. (Dept. Electr. Eng., Univ. Alberta, Edmonton, Canada). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 73-83.

Gastric electrical control activity was recorded from 9 patients during and for 5 days following laparotomy (cholecystectomy, 7 patients; Nissen fundoplication and splenoctomy, 1; splenectomy and incidental cholecystectomy, 1). Three pairs of recording electrodes were implanted in the seromuscular layer of the anterior gastric wall near the greater curvature. The distal pair of electrodes was located 1-3 cm from the pylorus and the proximal pair 10-15 cm from the pylorus. The lead wires were brought out along with a Penrose drain and 4-5 days later were removed with the drain. During surgery, the mean gastric electrical control activity was 2.7 cycles/min. The control activity was regular in all patients. The direction of the lag phase was aborad. In all patients, the gastric electrical control activity became highly irregular 15-180 min following the closure of the abdomen. Frequently the control wave became unphase-locked. Phase locking with an orad direction of phase lag was occasionally seen. In 7 patients the frequency during this period decreased while in 2 patients it increased. Response activity (spikes) did not occur during the period of irregular frequencies. From 7-25 hr after surgery, the gastric electrical control activity in all patients became regular with a mean frequency of 3.2 cycles/min. The mean frequency was higher after recovery than during surgery in all patients. Response activity also occurred when the electrical control activity recovered fully. The results indicate the potential diagnostic value of the gastrointestinal electrical control activity. Abnormalities in this activity may be related to gastrointestinal motility disorders in certain pathological states.

7721 INTESTINAL METAPLASIA OF GASTRIC MUCOSA: ITS FREQUENCY AND FUNCTIONAL PROPERTIES.

(E.) Simon, L.; Figus, A. I. (Jaszbereny Hosp., Hungary). *Neoplasma* 21(4):455-463, 1974.

The frequency of intestinal metaplasia in an Hungarian population was determined by histological examination of 125 stomachs resected for gastric carcinoma, 106 stomachs resected for gastric ulcer, and biopsy material from 678 patients with chronic gastritis and from 96 unoperated patients with gastric ulcer. The frequency of intestinal metaplasia increased with age and the incidence was higher in patients with gastric cancer than in other patient groups. Lactic acid dehydrogenase activity in gastric juice increased in direct proportion to the severity of atrophic gastritis; activity was highest in patients with atrophic gastritis plus intestinal metaplasia and in gastric cancer patients. The specific activity of β-glucuronidase in gastric juice exceeded normal limits only in patients with atrophic gastritis and intestinal metaplasia or gastric cancer of the intestinal type. Increased alkaline phosphatase activity in intestinalized gastric mucosa was demonstrated cytochemically and biochemically. The results indicate that the presence and amount of intestinal specific enzymes in gastric juice may be of value in detecting lesions.

7722 BASAL GASTRIC SECRETION IN MAN. CONTROL SUBJECTS AND PATIENTS WITH MYASTHENIA GRAVIS.

(E.) Schapiro, H.; Cape, C. A. (Univ. Tennessee Med. Units, Memphis). *Arch. Surg.* 109(3):400-401, 1974.

7723 STUDY OF CIRCADIAN RHYTHM OF GASTRINAEMIA.

(E.) Blasi, A.; Catalano, F.; Marletta, F.; Monello, S. (Cattedra Gastroenterol., Univ. Catania, Italy). *Rend. Gastroenterol.* 5(3):220, 1973.

7724 DOES PYLORIC COMPETENCE DEPEND ON ANTRO-DUODENAL CO-ORDINATION?

(E.) Johnson, A. G.; Kirk, C. J. C.; March, C. S. (Charing Cross Hosp., London, England). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 505-513.

7725 EFFECT OF ANTACIDS ON pH OF URINE.

(E.) Gibaldi, M.; Grundhofer, B.; Levy, G. (Sch. Pharmacy, State Univ. New York, Buffalo). *Clin. Pharmacol. Ther.* 16(3):520-525, 1974.

7726 CARBAZOCHROME SALICYLATE AND ITS ROLE IN ASPIRIN-INDUCED GASTRIC IRRITATION IN RATS.

(E.) Mangla, J. C.; Kim, Y.; Desbaillets, L. G. (Monroe Community Hosp., Rochester, N.Y.). *Am. J. Dig. Dis.* 19(9): 830-834, 1974.

7727 THE EFFECTS OF ASPIRIN, CARBENOXOLONE, AND GEFARNATE ON THE GASTRIC MUCOSAL POTENTIAL DIFFERENCE IN MAN.

(E.) Hossenbocus, A.; Colin-Jones, D. G. (Southampton Gen. Hosp., England). *Gut* 15(4):335-348, 1974.

7728 PYLORIC STENOSIS PRESENTING WITH HALITOSIS.

(E.) Tydd, T. F.; Dyer, N. H. (Worcester Roy. Infirm., England). *Br. Med. J.* 3(5926):321, 1974.

7729 MORPHOLOGICAL STUDY OF ENDOCRINE CELLS OF GASTRIC MUCOSA IN CASES OF ATROPHIC GASTRITIS.

(E.) Gasbarrini, G.; Miglio, F.; Bernardi, M.; Serra, M.; Bonvicini, F. (Pathol. Med. I, Univ. Bologna, Italy). *Rend. Gastroenterol.* 5(3):230-231, 1973.

730 THE CORRELATION BETWEEN THE MORPHO-FUNCTIONAL ASPECTS OF G-CELLS AND GASTRIN SECRETION IN UODENAL ULCER AND IN ATROPHIC GASTRITIS WITH HYPERGAS-RINAEMIA. *(E.)* Beltrami, C. A.; Fabris, G.; Marzola, .; Vezzadini, P.; Tomassetti, P.; Barbara, L. (Inst. athol. Med. I, Univ. Bologna, Italy). *Rend. Gastroenerol.* 5(3):221-222, 1973.

731 GASTRIC MOTILITY AND SERUM GASTRIN LEVELS IN CHRONIC ATROPHIC GASTRITIS. *(E.)* Bortootti, M.; Vezzadini, P.; Corinaldesi, R.; Barbara, L.; abo, G. (Inst. Pathol. Med. I, Univ. Bologna, Italy). *end. Gastroenterol.* 5(3):221, 1973.

732 CONGENITAL PARTIAL GASTRIC ANTRAL OBSTRUCTION, AN ELUSIVE CAUSE OF ABDOMINAL PAIN AND VOMIING. *(E.)* Woolley, M. M.; Gwinn, J. L.; Mares, A. Children's Hosp., Los Angeles, Calif.). *Ann. Surg.* 80(3):265-273, 1974.

733 GASTRIC POLYPECTOMY VIA THE PANENDOSCOPE. *(E.)* DeLuca, Jr., V. A.; Shapiro, B. S. Griffin Hosp., Derby, Conn.). *Conn. Med.* 38(9):459-60, 1974.

734 THERAPEUTIC ENDOSCOPY: REMOVAL OF AN UNUSUAL FOREIGN OBJECT FROM THE STOMACH. *(E.)* acianceno, S. E.; Joseph, R. R. (Wayne County Gen. osp., Eloise, Mich.). *Gastrointest. Endosc.* 21(1):34-5, 1974.

735 CARCINOMA OF THE STOMACH.. *(E.)* Lawrence, Jr., W. (Med. Coll. Virginia, Richmond). *S. fr. Cancer Bull.* 18(2):52-67, 1974.

736 GASTRIC LEIOMYOBLASTOMA. A CLINICAL AND ULTRASTRUCTURAL STUDY. *(E.)* Cornog, Jr., J. . (Yale Univ. Sch. Med., New Haven, Conn.). *Cancer* 4(3):711-719, 1974.

737 GASTRIC TERATOMA IN INFANTS. *(E.)* Aspiroz C., J.; Valle M., E.; Herberth F., A.; Carrilo A., V.; Vaca G., R. (La Raza Med. Ctr., Mexico City, exico). *Am. J. Surg.* 128(3):429-432, 1974.

738 STOMACH CANCER AND ECOLOGIC FACTORS IN JAPAN. *(E.)* Takahashi, E. (Tohoku Univ. Sch. Med., endai, Japan). *Tohoku J. Exp. Med.* 113(2):129-133, 974.

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7741 CHRONIC GASTRITIS: CLINICAL DIAGNOSIS OR INSIGNIFICANT BIOPSY FINDING? *(Cz.)* Hafter, E. (no affil.). *Cesk. Gastroenterol. Vyz.* 28(5):306-310, 1974.

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7748 EXPERIENCE WITH THE TREATMENT OF PATIENTS WITH NEGLECTED FORMS OF STOMACH CANCER. *(Rus.)* Solovko, A. Iu. (Konotop Centr. Reg. Munic. Hosp., Suma Dist., USSR). *Klin. Khir.* (6):25-28, 1973.

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7750 EXPERIMENTAL DEVELOPMENT AND CLINICAL APPLICATION OF THORACIC DUCT DRAINAGE AND ITS VALUE IN ASSESSING OPERABILITY AND PROGNOSIS IN STOMACH CANCER. *(Rus.)* Mirakian, M. M. (Armenian Inst. Roentgenol. Oncol., Erevan, USSR). *Eksp. Khir. Anesteziol.* (3):11-13, 1973.

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7751 GASTRIC CANCER AFTER GASTROENTEROSTOMY FOR PEPTIC ULCER. *(Rus.)* Mikhirev, I. V.; Mikhireva, T. N. (Kalinin Reg. Oncol. Dispensary, USSR). *Vopr. Onkol.* 20(6):98-100, 1974.

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7754 OPERATION FOR RESECTING THE GASTRIC MUCOSA: MUCOSECTOMY. *(Rus.)* Sigal, M. Z.; Agafonov, A. A. (Kazan Inst. Postgrad. Med., USSR). *Eksp. Khir. Anesteziol.* (3):38-40, 1973.

7755 GASTROFIBROSCOPY AND GASTRIC BIOPSY FOLLOWING GASTRIC RESECTION. *(Ger.)* Beno, I.; Babala, J. (Inst. Nutr. Res., Bratislava, Czechoslovakia). *Med. Welt* 24(52):2065-2068, 1973.

7756 ENDOSCOPIC POLYPECTOMY IN UPPER PORTION OF THE DIGESTIVE SYSTEM. *(Cz.)* Henke, M.; Strauch, M.; Ottenjann, R. (Munic. Hosp., Munich-Neuperlach, Germany). *Cesk. Gastroenterol. Vyz.* 28(5):362-365, 1974.

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7759 RELATIONSHIP OF THE HISTOLOGICAL APPEARANCE OF THE GASTRIC MUCOSA AND ITS SECRETORY ACTIVITY IN MAN. *(Cz.)* Varro, V.; Karacsony, G.; Pach, E. (Med. Fac., Univ. Szeged, Hungary). *Cesk. Gastroenterol. Vyz.* 28(5):331-336, 1974.

7760 GASTRIC MUCUS IN THE RAT: QUANTITIVE AND QUALITATIVE CHANGES IN EXPERIMENTAL STRESS ULCER. *(It.)* Pallavicini, G.; Cetta, G.; Fossati, G.; Castellani, A. A. (Inst. Biochem., Fac. Sci., Univ. Pavia, Italy). *Boll. Soc. Ital. Biol. Sper.* 49(18 bis):no. 159, 1973.

See also, 7354, 7444, 7651, 7663, 7664, 7666, 7671, 7692, 7763, 7839, 7855, 7928, 8080, 8106, 8122.

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Peptic Ulcers

7761 COLONIC MOTILITY AND PRE-OPERATIVE BOWEL HABIT IN PATIENTS WITH DIARRHEA FOLLOWING VAGOTOMY AND PYLOROPLASTY. *(E.)* Waller, S. L. (Central Middlesex Hosp., London, England). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973.* pp. 197-199.

Following vagotomy and pyloroplasty 79 patients were carefully questioned about their pre- and postoperative bowel habit. Of 22 who complained of diarrhea after the operation, 8 had a pre-operative bowel habit suggestive of the irritable bowel syndrome. Of 57 patients who did not complain of diarrhea after the same operation, only 1 had apparent pre-operative irritable bowel syndrome. Postoperative diarrhea was of two distinct types, either early morning (13 patients) or post-cibal (9 patients). Left colonic studies before, during, and after eating were performed on 28 patients; 12 with early morning diarrhea, 8 with post-cibal diarrhea, and 8 without diarrhea. At sigmoidoscopy intense spasm was often noted in patients with early morning diarrhea (7 of the 12), but infrequently in either post-cibal (2 of 8) or control (2 of 8) patients. Left colonic motor activity was unremarkable in either post-cibal diarrhea or in controls. In patients with early morning diarrhea, colonic motor activity increased markedly during the 30 min after the meal. The onset of colonic response to food in these patients closely resembled that in patients with diarrhea due to the irritable bowel syndrome, except that this response occurred later in these postoperative patients. This delay in response may have resulted from initially slow gastric emptying for solids. It is suggested that pre-operative bowel habit may be important in deciding which patients are likely to develop diarrhea after vagotomy and pyloroplasty.

7762 METIAMIDE, AN H_2-RECEPTOR BLOCKER, AS INHIBITOR OF BASAL AND MEAL-STIMULATED GASTRIC ACID SECRETION IN PATIENTS WITH DUODENAL ULCER. *(E.)* Mainardi, M.; Maxwell, V.; Sturdevant, A. L.; Isenberg, J. I. (VA Wadsworth Hosp. Ctr., Los Angeles, Calif.). *N. Engl. J. Med.* 291(8):373-376, 1974.

The effect of p.o. metiamide on basal and peptone meal-stimulated gastric acid secretion was studied in 17 men (mean age 48 yr) with uncomplicated duodenal ulcer. Basal secretion after a single dose of metiamide (100, 200, or 300 mg) was investigated in 15 patients. Meal-stimulated secretion after 3 doses of metiamide (100, 200, and 300 mg) and placebo was studied in 5 patients. All 3 doses significantly inhibited basal and meal-stimulated acid secretion. Basal acid secretion decreased by 55% after 100 mg and by more than 80% after 200 or 300 mg. The differences were not statistically significant. Acid secretion stimulated by a 10% peptone meal at pH 5.5 decreased by more than 80% after 300 mg, and this inhibition was significantly higher than that after 100 or 200 mg. Inhibition of meal-stimulated secretion correlated significantly with peak blood metiamide level and 48-hr urinary excretion of the drug and its metabolites. Closer correlations were obtained with peak blood level than with ingested dose. Metiamide did not affect basal or peptone-stimulated blood gastrin levels. The patients reported no side effects and physical examinations and laboratory profiles revealed no abnormalities after drug administration. These findings indicate that metiamide may be useful in the treatment of patients with peptic ulcers. However, clinical testing of its prolonged use in the treatment of duodenal ulcer has been discontinued in the United States because transient agranulocytosis has occurred in 2 patients on chronic therapy.

7763 THE EFFECT OF VAGOTOMY AND DRAINAGE OPERATIONS ON THE RATE OF GASTRIC EMPTYING IN DUODENAL ULCER PATIENTS.

(E.) Davies, W. T.; Griffith, G. H.; Owen, G. M.; Shields, R. (United Cardiff, Velindre Hosp., Cardiff, Wales). *Br. J. Surg.* 61(7): 509-515, 1974.

To evaluate effects of vagotomy and 3 different types of gastric drainage procedures, the rate of gastric emptying was measured in 29 patients (5 women and 24 men, aged 29-71 yr) before and after duodenal ulcer surgery. The drainage procedures were the Finney or Heineke-Mikulicz pyloroplasty and gastrojejunostomy. Passage through the stomach of ^{51}Cr (200 μC), incorporated in a standard test meal, was followed by external scanning with an automatic scintiscanner. The rate of gastric emptying was expressed as the half-life (T 1/2) of the meal in the stomach. In all instances, postoperative rates were invalid due to temporary gastric stasis if measured before a 2-month recovery period. In 14 patients with Finney pyloroplasty, the mean T 1/2 was 59 min before surgery and 46.7 min afterwards. Nine patients with Heineke-Mikulicz pyloroplasty had a preoperative mean T 1/2 of 52 min which increased to 64.6 min postoperatively. Pre- and postoperative rates of gastric emptying followed no definite pattern in the 6 patients who had undergone gastroenterostomy. To check completeness of vagotomy, the insulin test was applied to 21 patients and 6 were found to be incompletely vagotomized: 4 with Finney drainage, 1 with Heineke-Mikulicz drainage, and 1 with gastroenterostomy. However, their postoperative T 1/2 did not differ significantly from the patients with complete vagotomy. These findings indicate that the Finney pyloroplasty is the most efficient drainage procedure of the 3 investigated in patients with duodenal ulcers. Although the long-term stability of the insulin test has recently been questioned, these results suggest that gastric emptying may be more related to the type of drainage operation used than to the vagotomy.

7764 PRODUCTION OF DUODENAL ULCERS IN THE RAT BY ADMINISTRATION OF DIGITOXIN.

(E.) Robert, A.; Nezamis, J. E.; Lancaster, C.; Badalamenti, J. N. (Exp. Biol., Upjohn Co., Kalamazoo, Mich.). *Experientia* 30(7):781-783, 1974.

The toxic and ulcerogenic effects of digitoxin (0.75 mg/kg for 4 days) were studied in 100 male and 100 female rats. Only 2% of the males died during digitoxin treatment compared with 18% of the females. The females also lost more weight than the males and 83% developed convulsions as opposed to 8% of the males. Duodenal ulcers were found in 50% of the females and in 2% of the males, while gastric ulcers occurred only in females (20%). Following 1 day of treatment, the stomach became progressively distended with food, being 3-5 times as large as that of control animals. In a separate experiment, animals were sacrificed 1-4 days after digitoxin treatment. The evolution of duodenal ulcers was apparent after 2 days with the appearance of tiny parallel red lines on the serosal surface, perpendicular to the duodenal axis and opposite to the mesenteric attachment; thrombosis could not be verified histologically. Incision revealed a small ulcer in the mucosa at the exact point where the red lines were evident on the serosa. With time, the red lines increased in number and covered an area of 2-3 mm; after 3-4 days, a well-formed ulcer was visible on the serosa as a bulging blister or a punched-out crater. The lesion reached the muscle layer in a few cases, but duodenal perforation occurred in only 1 animal. While the mechanism by which digitoxin induced duodenal ulcers is unknown, a vascular origin is suspected. Whether the greater resistance of male rats to digitoxin intoxication is due to androgens or other factors was not determined.

7765 PREVALENCE OF ALPHA$_1$-ANTITRYPSIN DEFICIENCY IN PATIENTS WITH GASTRIC OR DUODENAL ULCER.

(E.) Andre, F.; Andre, C.; Lambert, R.; Descos, F. (Edouard Herriot Hosp., Lyon, France). *Biomedicine (Paris)* 21(5):222-224, 1974.

In adult male patients (114 with duodenal ulcers, 83 with gastric ulcers, and 118 without gastrointestinal disease), serum α_1-antitrypsin concentrations were analyzed quantitatively by radial immunodiffusion. Deficiency levels were set at a serum value of less than 60% normal (1.68 mg/ml). Of the 315 patients, α_1-antitrypsin deficiency was observed in 24; all were of the heterozygous type because although the sera were not subjected to phenotyping, no values lower than 0.5 mg/ml (homozygous levels) were measured. The deficiency was found in 3.3% of control subjects, 9.6% of gastric ulcer patients, and 10.5% of duodenal ulcer patients. The last value was significantly greater than control deficiency levels. Comparison of the age of peptic ulcer onset in patients with and without α_1-antitrypsin deficiency showed no differences. According to the polygenic theory of inheritance for peptic ulcer, inheritance of the disease is separate for gastric and duodenal ulcers and higher for the latter. Blood group substances and secretor status, taste sensitivity, and salivary flow in response to citric acid stimulation have been reported to be highly correlated with duodenal ulcer. The present results suggest a similar significant correlation between α_1-antitrypsin deficiency and duodenal ulcer.

7766 THE EFFECT OF METOCLOPRAMIDE ON GASTRIC EMPTYING OF SOLID MEALS.

(E.) Hancock, B. D.; Bowen-Jones, E.; Dixon, R.; Dymock, I. W.; Cowley, D. J. (Univ. Hosp. South Manchester, Manchester, England). *Gut* 15(6):462-467, 1974.

Gastric emptying of a ^{51}Cr labeled (200 μC) solid meal was measured to gauge effects of metoclopramide in 10 normal controls and 10 duodenal ulcer patients following truncal vagotomy and pyloroplasty. One postvagotomy patient was examined 3 months after surgery, the remaining 9 at a mean interval of 15 days after surgery. Half the subjects received i.v. metoclopramide (10 mg/2 ml saline) while 2 ml saline was administered i.v. to the other 1/2 in a random double-blind manner. After a mean interval of 3-12 days, each subject received an i.v. injection of the other material. All were tested in a recumbent position, and gastric emptying was observed by a gamma camera for 90 min. Results in the 10 control subjects showed no significant differences between gastric emptying rates after metoclopramide or saline administration at any time, and the same pattern appeared in 4 postvagotomy patients with emptying times in the normal range expressed as half-life (T 1/2 30-150 min). In the other 6 vagotomy patients with abnormally delayed emptying times (mean T 1/2 369 min), metoclopramide produced a significant improvement (mean T 1/2 194 min). The results suggest that this drug accelerates emptying time only when the rate is delayed and not when it is normal. Although the mechanism by which metoclopramide exerts its effect is not yet clear, previous studies indicate that the stimulatory effect on gastric motility is not dependent on the integrity of the vagus nerves. In addition, the postoperative delay in gastric emptying does not appear to be related either to completeness of vagotomy or to size or type of pyloroplasty. Since impaired emptying can lead to epigastric fullness, discomfort, nausea, and vomiting, metoclopramide can relieve these symptoms by improved speed of emptying.

7767 THE INSULIN INFUSION TEST FOR VAGOTOMY.

(E.) Carter, D. C.; Pinto, D. J. (Dept. Surg., Makerere Univ., Kampala, Uganda). *East Afr. Med. J.* 51(2):206-213, 1974.

Studies were conducted to determine the reliability of a modified insulin infusion test in detecting intact vagal fibers in postvagotomy patients. In this test, 0.04 U of regular insulin/kg/hr are infused i.v. following a 12-hour fast, and gastric aspirates are periodically tested for acid concentration. In 9 normal volunteers, gastric acid secretion increased and reached a plateau within 75 min. Venous blood glucose levels fell to a mean of 28 mg% and remained at this concentration. A positive response to insulin infusion was also obtained in 3 preoperative duodenal ulcer patients and in 2 subjects with recurrent dyspepsia following unknown operations for duodenal ulcer. One patient was subsequently reexplored and found to have intact vagi. Two preoperative gastritis and gastric ulcer patients had unequivocally positive tests and a 3rd patient had an equivocally positive test. Only 4 of 14 postvagotomy peptic ulcer patients had a negative infusion test. The remaining 10, however, had recurrent symptoms and were thus suspect. The test thus appears relatively easy to use with no side effects and should be considered as an alternative to the potentially dangerous Hollander test.

7768 GASTROGRAFIN IN PERFORATED DUODENAL ULCER AND ACUTE PANCREATITIS.

(E.) Graser, G. M.; Fraser, I. D. (Leith Hosp., Edinburgh, Scotland). *Clin. Radiol.* 25(3):397-402, 1974.

Meglumine diatrizoate (50 ml, p.o.) was administered to 51 patients with suspected perforated duodenal ulcer or acute pancreatitis 5 min before chest and abdominal films were taken. By this method 24 of 25 cases (21 males and 4 females, aged 18-79 yr) with perforated duodenal ulcer were correctly diagnosed. Of these 25 cases, 17 (68%) showed free gas and 24 (96%) showed either free gas or a leak of meglumine diatrizoate or both. The one case not diagnosed had a sealed perforation. The time interval between the perforation and the x-ray examination seems to be an important factor in determining whether free intraperitoneal gas is seen. In all 7 patients in whom no free gas was noted but who had a leak of contrast medium a relatively short time elapsed (mean 2 1/2 hr) between perforation and examination, whereas the mean time interval for the whole series was 8 hr. By the use of meglumine diatrizoate 9 out of 10 cases of acute pancreatitis were also correctly diagnosed; all were males, aged 31-73 yr, and all were seen within 48 hr of onset of symptoms while the pancreas was still swollen and edematous. The 9 correctly diagnosed cases showed either stretching of the duodenal loop or upward displacement of the body of the stomach, or both these signs. This technique correctly diagnosed only 2 of 6 cases of active duodenal ulcer which had not perforated.

7769 EFFECT OF ATROPINE ON GASTRIN AND GASTRIC ACID RESPONSE TO PEPTONE MEAL.

(E.) Konturek, S. J.; Biernat, J.; Oleksy, J.; Rehfeld, J. F.; Stadil, F. (Med. Acad., Krakow, Poland). *J. Clin. Invest.* 54(3):593-597, 1974.

The action of atropine on meal- and pentagastrin-induced gastric acid secretion was studied in 6 patients with chronic duodenal ulcer disease (aged 37-53 yr). A test meal of 10% peptone solution adjusted to pH 5.0 was maintained in the stomach at a distention pressure of 15 cm H_2O. A modification of the intragastric titration method of Fordtran and Walsh was used to measure gastric acid output by monitoring the rate at which a solution of 0.5 M sodium bicarbonate had to be added to keep the pH of the gastric content consistant at the pH 5.0 value. Serum gastrin concentrations were measured simultaneously by radioimmunoassay. Pentagastrin infusion (2 μg/kg/hr for 13 15-min periods) caused acid output to peak at 10.0 mEq/15 min in the third 15 min period of infusion and then decline to about 83% of the initial peak at the end of the test. Atropine (25 μg/kg/hr i.v.) inhibited pentagastrin-induced acid secretion by about 30%. After atropine withdrawal, acid output returned towards control levels. Atropine inhibited meal-induced acid secretion by about 70%. After infusion of the test meal, the serum gastrin concentration rose to 3 times the fasting value. Atropine did not change serum gastrin levels. Thus atropine is a very strong inhibitor of food-induced gastric acid secretion but does not significantly change serum gastrin response to feeding in duodenal ulcer patients when postprandial gastric acidity and intragastric pressure are kept constant. All patients receiving atropine showed symptoms of dryness of mouth, increased pulse, dilation of pupils, and occasionally blurring of vision. The use of anticholinergic drugs clinically is not necessarily appropriate, since the toxic effects observed at this dose level probably could not be tolerated for more than an acute experimental procedure. Atropine inhibited meal-induced acid secretion more than pentagastrin-induced secretion, suggesting that cholinergic innervation may be important in the stimulation of the oxyntic glands by food.

7770 ELECTROMYOGRAPHIC STUDY OF MODIFICATIONS OF GASTRODUODENAL MOTILITY AFTER PROXIMAL SELECTIVE VAGOTOMY IN MAN. *(E.)* Salducci, J.; Picaud, R.; Naudy, B.; Dalmas, H.; Monges, H. (Nord Hosp., Marseille, France). *Digestion* 10(3):242, 1974.

Proximal selective vagotomy was performed on 10 patients with duodenal ulcer. An electromyographic study of gastroduodenal motility was subsequently performed. Readings started 24 hr after operation and continued for 7 days. Slow wave or basic electrical rhythm was recorded as triphasic or polyphasic complexes, and spiking activity was recorded as bursts of fast spike potentials. On the 1st day, gastric basic electrical rhythm occurred regularly and migrated abroad with a fixed rhythm. However, within 3 days after operation, a transitory increase of the basic electrical rhythm frequency and a slowing of the basic electrical rhythm conduction was noted. These modifications then disappeared. Spiking activity was recorded in the duodenum 24 hr after operation and appeared in the stomach 48 hr postoperatively. Such activity was viewed as bursts of fast spikes superimposed on each gastric and duodenal basic electrical rhythm. Recordings obtained 48 hr postoperatively were similar to those performed on cholecystectomized patients. This electromyographic study supports clinical evidence that important disturbances of gastric emptying do not occur following selective vagotomy and suggests that a drainage procedure may be unnecessary.

7771 MECHANISM OF ULCEROGENIC ACTIVITY OF RESERPINE IN ALBINO RATS. *(E.)* Gupta, M. B.; Tangri, K. K.; Bhargava, K. P. (King George's Med. Coll., Lucknow, India). *Eur. J. Pharmacol.* 27(2): 269-271, 1974.

Reserpine (5 mg/kg, i.m.) was injected into 10 adult albino rats. The stomach and duodenum were examined 20 hr after injection. To elucidate the mechanism of ulcerogenic activity of reserpine, the animals were pretreated i.p. 30 min prior to reserpine injection with drugs known to influence adrenergic and cholinergic functions, except for 6-hydroxydopamine which was administered 24 hr earlier. In some experiments, reserpine-induced gastric ulceration was investigated in bilaterally adrenalectomized animals and after lateral cerebral ventricle injection. I.m. reserpine (5 mg/kg) showed 100% ulcerogenic activity, but lateral cerebral ventricle injection (250 μg/kg) failed to cause gastric ulceration. Tetrabenazine (200 mg/kg, i.p.) also failed to induce gastric ulceration in albino rats. Bilateral adrenalectomy did not protect the animals against gastric ulceration induced by peripheral administration of reserpine. The α-adrenoceptor antagonists phenoxybenzamine and phentolamine (each 5 mg/kg) significantly reduced the ulcerogenic activity of reserpine, whereas the β-adrenoceptor antagonist propranolol (5 mg/kg) did not protect animals against reserpine-induced gastric ulceration. Ulcerogenic activity was not attributed to 6-hydroxydopamine (50 mg/kg) but the drug did afford protection against the ulcerogenic activity of reserpine. The cholinolytic agent atropine methylnitrate (5 mg/kg also significantly protected against reserpine-induced gastric ulceration. It is suggested that catecholamines released from peripheral sympathetic nervous system are involved in the production of gastric ulcers by reserpine. The protective effects of both 6-hydroxydopamine and atropine methylnitrate indicate the involvement of peripheral cholinergic and adrenergic mechanisms in the ulceration induced by reserpine. However, it is not known how far the cholinergic mechanism is concerned in the release of the adrenergic transmitter necessary for the production of ulcer by reserpine.

7772 ENDOSCOPICAL AND HISTOLOGICAL STUDIES ON VITAL STAINING OF DUODENAL MUCOSA. *(E.)* Kohli, Y.; Nakajima, M.; Kawai, K. (Kyoto Prefect. Univ. Med., Japan). *Endoscopy* 6(2):105-110, 1974.

In endoscopic examinations of 103 patients, 0.2% methylene blue solution or 0.2% indigocarmine solution was directly scattered on the duodenal mucosa through a Teflon tube inserted in the duodenofiberscope. The patients had duodenal ulcer or its scar (49 cases), duodenal erosion (5), duodenal polyp (4), gastroduodenal ulcer or its scar (13), gastric ulcer or its scar (19), gastric polyp (2), and gastritis (11). Both dyes were scattered on separate occasions in 34.9% of the cases, while the methylene blue solution was used in 26.2% of cases and the indigocarmine solution in 38.9%. With the indigocarmine solution, minute elevations were observed in detail in 17 of 58 cases unrecognized at usual endoscopy; similarly, 30 cases of minute depression were observed among 67 cases negative at usual endoscopy. Duodenal villi in normal mucosa were stained by the methylene blue solution whereas villi around duodenal ulcer remained unstained and appeared irregular in shape. Comparison with histological findings showed that the stainability of duodenal mucosa corresponded to the healing of duodenal ulcer or the degree of glandular maturity of the duodenal mucosa. Mucosal staining by the 0.2% methylene blue solution indicates complete healing of duodenal ulcer or duodenitis.

7773 A DUODENAL ROLE IN GASTRIN RELEASE. *(E.)*

Hayes, J. R.; Ardill, J.; Kennedy, T. L.; Buchanan, K. D. (Dept. Med., Queen's Univ. Belfast, Northern Ireland). *Gut* 15(8):626-629, 1974.

Plasma gastrin response to a protein test meal was determined in 5 patients with the dumping syndrome following selective vagotomy and pyloroplasty, in 5 patients with pyloric stenosis, and in 10 duodenal ulcer patients asymptomatic after selective vagotomy and pyloroplasty or selective vagotomy and gastrojejunostomy. In patients without pyloric obstruction, the peak gastrin response to protein occurred at 30-45 min. In patients with the dumping syndrome and presumed rapid gastric emptying, peak levels occurred in the 15-min sample, suggesting that food must pass into the duodenum for gastrin levels to rise. In contrast to patients with uncomplicated duodenal ulceration and patients with the dumping syndrome, test gastrin levels in patients with pyloric stenosis did not differ significantly from the fasting level. In 1 patient, however, the gastrin response to protein feeding peaked at 60 min, further strengthening the concept of a duodenal role in the mechanism of gastrin release. Comparison of the gastrin responses in patients with pyloroplasty and in patients with gastrojejunostomy showed that gastrin response was significantly greater when protein entered the duodenum directly than when it was possible for food to bypass the duodenum. Further evidence of a duodenal role in gastrin release was the finding in 1 normal subject that gastrin levels peaked 15 min after intraduodenal administration of the test meal, whereas with intragastric administration peak levels occurred at 30 min.

7774 ACID AND PEPSIN SECRETION IN DUODENAL ULCER PATIENTS IN RESPONSE TO GRADED DOSES OF PENTAGASTRIN OR PENTAGASTRIN AND CARBACHOLINE BEFORE AND AFTER PROXIMAL GASTRIC VAGOTOMY. *(E.)*

Roland, M.; Berstad, A.; Liavag, I. (Aker Univ. Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(6):511-518, 1974.

Before and 3 and 6 months after proximal gastric vagotomy, 9 patients with duodenal ulcer (2 women and 7 men, aged 19-65 yr) were infused with graded doses of pentagastrin (0.15, 1.5, or 15 μg/kg/hr) on separate days and in random order. At 6 months carbacholine (1-2 μg/kg/hr) was infused simultaneously with pentagastrin. The calculated maximal acid output in response to pentagastrin alone decreased from 34.7 mEq/hr preoperatively to 17.3 mEq/hr 3 months after the operation, and the half maximal response increased from 0.05 to 0.18 μg/kg/hr. When carbacholine was added to pentagastrin, maximal acid output was 18.4 mEq/hr and the half maximal response was reduced to 0.07 μg/kg/hr. Proximal gastric vagotomy caused a greater reduction of acid output stimulated with a low than with a high dose of pentagastrin. Because of the preoperative fall in pepsin output with the highest dose of pentagastrin, maximal and half maximal responses could not be calculated. After vagotomy the maximal response for pepsin with pentagastrin alone was 98.9 mg/hr. With carbacholine added to pentagastrin, the maximal pepsin response increased to 132.0 mg/hr. The dose of pentagastrin giving half maximal response for pepsin was 0.07 μg/hr postoperatively and remained almost unchanged (0.05 μg/kg/hr) when carbacholine was added. The results indicate that proximal gastric vagotomy decreases the sensitivity of the parietal and chief cells to pentagastrin stimulation. Carbacholine restores the sensitivity of the parietal cells to preoperative levels without influencing maximal acid secretory capacity. Although carbacholine does not change the postoperative sensitivity of the chief cells, it significantly influences maximal pepsin secretion.

7775 TAUROCHOLATE METABOLISM AFTER TRUNCAL VAGOTOMY AND PYLOROPLASTY OR ANTRAL RESECTION.

(E.) Arnesjo, R.; Stahl, E. (Dept. Surg., Univ. Lund, Sweden). *Scand. J. Gastroenterol.* 9(6):601-606, 1974.

Tracer doses of doubly labeled taurocholate (^{25}S-tauro-7-^{3}H-cholate) corresponding to 10 μC of each isotope were given in a test meal to 8 patients (2 women and 7 men, aged 29-55 yr) who had undergone truncal vagotomy and pyloroplasty or antral resection for benign duodenal ulcer. Duodenal aspirates from the subsequent 7 days were examined. Results were compared with those obtained from 9 healthy controls (4 women and 5 men, aged 22-38 yr). Mean taurocholate pool size was 0.59 ± 0.18 g in the 8 patients and 0.90 ± 0.30 g in controls; the half-life of the taurocholate pool was 1.2 ± 0.5 days in patients and 2.1 ± 0.5 days in controls. These differences were statistically significant. The mean daily production of taurocholate in patients was 0.29 ± 0.05 g and was not significantly different from that of the control group (0.32 ± 0.14 g). Both the average fractional deconjugation rate and the 7-α-dehydroxylation rate were significantly increased in patients (0.19 ± 0.06 and 140 ± 2.5%/day, resp.) compared with controls (0.10 ± 0.06 and 5.8 ± 2.4%/day). The alteration in taurocholate metabolism suggests that contamination of the small intestine with colonic bacteria plays a role in the genesis of the altered bowel habits subsequent to truncal vagotomy and possibly also of postvagotomy diarrhea.

7776 THE FEATURES AND COURSE OF BILE VOMITING FOLLOWING GASTRIC SURGERY. *(E.)*

Griffiths, J. M. T. (Western Gen. Hosp., Edinburgh, Scotland). *Br. J. Surg.* 61(8):617-622, 1974.

Of 1311 patients (973 men and 338 women) undergoing peptic ulcer surgery over an 11-yr period, 119 (9.1%) developed postoperative bile vomiting. The incidence of vomiting was less than 1% up to age 20, 3-8% between 30-50 yr, and 20% when surgery was performed on patients over 60 yr. Both men and women were equally at risk. The overall incidence of bile vomiting was highest after vagotomy and gastrectomy (15.7%) and vagotomy and gastrojejunostomy (10.7%). The complication did not occur after 55 simple gastrojejunostomies. Vomiting developed within 1 month of surgery in 39% of the patients, and 57% suffered a significant degree of disability for 6-14 yr after onset. The principal organic cause of the vomiting appeared to be gastric outlet obstruction and gastritis due to bile reflux. Of the 26 patients who required reoperation, 8 had normal findings on barium examination, but at operation definite pathology (e.g., gastritis, stomal ulcer, obstruction of the efferent loop) was discovered in each case. Of 39 patients referred for formal psychiatric assessment, 17 had an endogenous or reactive depression; no abnormality was found in the other 22 cases. Of the 85 patients managed conservatively, vomiting has settled completely in 19.8%, 47.7% have occasional vomiting, and 9.1% are still disabled. An organic basis should be suspected if vomiting persists longer than 6 months after peptic ulcer surgery. Investigations should include barium studies and endoscopy. A role for psychological symptoms in the etiology should be viewed with caution. Negative investigation does not necessarily contraindicate reoperation, especially when symptoms are disabling.

7777 INFLUENCE OF TRUNCAL VAGOTOMY ON CANINE GASTRIC EMPTYING OF LIQUIDS.

(E.) Springfield, A. C.; Weddle, II, C. O.; Ormsbee, III, H. S.; Barreras, R. F.; Bass, P. (Dept. Surg., Univ. Wisconsin, Madison). *Am. J. Surg.* 128(5):678-682, 1974.

The effect of truncal vagotomy and truncal vagotomy with pyloroplasty on canine gastric emptying was studied with a liquid test meal (300 ml trisodium citrate, 19.6 g/liter) and a liquid-fat meal (300 ml trisodium citrate with 10 mM oleic acid). The time required for the total gastric contents to be reduced to 150 ml was 12 min for the citrate meal and 54 min for the citrate-fat meal. The emptying rate was not significantly altered by truncal vagotomy alone or truncal vagotomy combined with pyloroplasty. Bethanechol (0.1 mg/kg s.c.) and insulin (0.5 U/kg i.v.) enhanced the presurgery emptying of the citrate-fat test meal by 26.9 and 62.1%, resp. Bethanechol significantly increased gastric emptying in animals with truncal vagotomy (26.9-71.1%) and truncal vagotomy with pyloroplasty (26.9-80.1%). In contrast, the enhanced emptying with insulin was significantly reduced after truncal vagotomy alone (62.1-17.5%) or truncal vagotomy combined with pyloroplasty (62.1-22.8%). Fasting gastrin levels were increased after truncal vagotomy (100.4 *versus* 137.5 pg/ml) and were significantly reduced after the addition of pyloroplasty (137.5 *versus* 71.9 pg/ml). The results suggest that the intact vagus nerve is important in the gastric emptying of solids but not in the gastric emptying of liquids. The effects of bethanechol and insulin demonstrate the importance of parasympathetic nerves in controlling stomach emptying.

7778 ROLE OF GASTRIC IRRADIATION IN MANAGEMENT OF PEPTIC ULCERATION AND OESOPHAGITIS.

(E.) Findlay, J. M.; Newaishy, G. A.; Sircus, W.; McManus, J. P. A. (Western Gen. Hosp., Edinburgh, Scotland). *Br. Med. J.* 3(5974):769-771, 1974.

A group of 24 at-risk patients with peptic esophagitis or ulcerations of the stomach or duodenum were treated with gastric radiotherapy. Surgery was precluded because of failure of previous surgery, associated medical complications, or age (83% of the patients were aged 60 yr or older). Presenting symptoms were dysphagia (11 cases), heartburn (8), epigastric pain (8), bleeding (7), and backache (1). Of the 24 patients, 16 had complete symptomatic relief after a single course of therapy (1500 r given as two 5-day courses of 150 r/day). Three patients had partial symptomatic relief and another 3 achieved complete symptomatic relief after further courses of irradiation in increased dosage. Symptomatic improvement was closely correlated with endoscopic appearance in all but 1 case; the exception was a patient with severe esophagitis who obtained complete symptomatic relief without endoscopic change. Mean acid output was reduced to 30% of preirradiation levels at 10.7 months and to 58% at 30 months. No morbidity was observed attributable to the irradiation.

7779 THE RESPONSE OF GASTRIC SECRETION AND SERUM GASTRIN TO AN INSULIN INFUSION TEST IN PATIENTS WITH DUODENAL ULCER.

(E.) Girvan, D. P.; Hansky, J.; Spencer, J.; Baron, J. H. (Roy. Postgrad. Med. Sch., London, England). *Am. J. Dig. Dis.* 19(11):977-986, 1974.

An i.v. infusion of insulin (014 U/kg/hr for 2 1/2 hr) was performed on 26 patients with chronic duodenal ulcer. In 15 patients this infusion test was compared with the standard test of a single i.v. injection of insulin (0.2 U/kg). The mean lowest blood glucose level in the infusion group (25.1 mg/100 ml) was significantly higher than in the standard test (17.4 mg/100 ml), and the interval from injection to acid stimulation was almost twice as long (75 *versus* 45 min). The peak acid output and mean rise in acidity were comparable in the 2 procedures. Serum gastrin responded reciprocally to insulin-induced hypoglycemia with a significant inverse correlation between blood glucose and gastrin. In 13 patients tested after vagotomy, there was no significant difference in the rise of acidities in the insulin infusion and the standard insulin test groups, and the Hollander status was the same in all but 1 patient. The mean basal, peak, and absolute rise of serum gastrin in unoperated patients and patients with incomplete vagotomy (9) were almost identical. In patients with complete vagotomy (6), there was no significant rise in serum gastrin after insulin infusion. Side effects were fewer and less severe in patients undergoing the infusion test than in the standard test. Tremor and chest discomfort, both signs of more severe hypoglycemic response, were mentioned on 2 occasions in the standard test group but never in the infusion group. The insulin infusion test is recommended as a safer and more acceptable test since it avoids severe hypoglycemia and has milder side effects while achieving comparable acidity and acid outputs. Serum gastrin measurements after either test provide no additional help in assessing the completeness of vagotomy.

7780 EFFECT OF HISTAMINE H_2-RECEPTOR BLOCKADE ON VAGALLY INDUCED GASTRIC SECRETION IN MAN.

(E.) Carter, D. C.; Forrest, J. A. H.; Werner, M.; Heading, R. C.; Park, J.; Shearman, D. J. C. (Roy. Infirm., Edinburgh, Scotland). *Br. Med. J.* 3(5930):554-556, 1974.

Metiamide, an antagonist of histamine H_2 receptors, was administered i.v. to normal subjects and to patients during vagal stimulation with a constant infusion of insulin. The 6 normal subjects (aged 27-34 yr) received 0.03 U/kg/hr insulin for 150 min. After 60 min of insulin infusion, 250 mg metiamide diluted to 13.2 ml was delivered at a constant rate of 200 mg/hr for 75 min. Five male patients with chronic peptic ulceration (4 duodenal and 1 gastric, aged 34-63 yr) received identical treatment except that an insulin dose level of 0.04 U/kg/hr was used. An additional 4 patients (3 men and 1 woman, aged 34-52 yr) with chronic duodenal ulceration received 0.04 U/kg/hr insulin for 180 min. After 105 min, an i.v. infusion of 200 mg metiamide diluted to 10.6 ml was carried out at a constant rate for 75 min. An additional 5 subjects (2 healthy volunteers and 3 with peptic ulcer disease) were treated with tritium-labeled metiamide to estimate the plasma metiamide levels achieved. In normal and peptic ulcer subjects there were reductions of 70% and 71%, resp., in gastric acid output compared with control tests on the same subjects. The decreased acid output resulted from a reduction in both volume of secretion and acid concentration. The plasma concentrations achieved were comparable to those following a 300 mg p.o. dose of this metiamide. The drug is thus a potent inhibitor of vagally-induced gastric acid secretion.

7781 THE EFFECT OF VAGOTOMY ON THE INHIBITION OF GASTRIC SECRETION BY INTRADUODENAL ACID.

(E.) Ward, A. S. (Roy. Infirm., Sheffield, England). *Br. J. Surg.* 61(9):698-704, 1974.

The effect of intraduodenal hydrochloric acid on pentagastrin-stimulated gastric secretion was studied in 17 control subjects (14 men and 3 women), 32 preoperative duodenal ulcer patients (31 men and 1 woman, average age 45 yr), and 28 vagotomized patients (24 men and 4 women, average age 47 yr). Of the vagotomized patients, 16 underwent truncal vagotomy and pyloroplasty, 6 selective vagotomy and pyloroplasty and 6 highly selective vagotomy. Inhibition of acid output occurred in 15 of 17 controls. The response was immediate and lasted for over 30 min in nearly all cases. The mean acid output for the group as a whole fell from 5.65 to 3.15 mEq/10 min. The mean inhibition for the group was 2.68 mEq/10 min. Inhibition occurred in 22 of the 32 preoperative duodenal ulcer patients. The mean plateau output for this group fell from 7.65 to 5.39 mEq/10 min. Significantly, the mean inhibition was 2.26 mEq/10 min. There was no response to intraduodenal acid in any patient tested after selective and highly selective vagotomy. This study indicates that acid in the duodenum inhibits pentagastrin-stimulated gastric secretion in man. This inhibition is not related to changes in pyloric loss. The results suggest that gastric secretory inhibition by intraduodenal acid is a vagal phenomenon in man. Selective and highly selective vagotomy do not carry any particular advantage over truncal section in terms of preserving this response.

7782 THE EFFECT OF CALCIUM ON GASTRIC ACID AND GASTRIN SECRETION IN ANTRECTOMIZED SUBJECTS.

(E.) Christiansen, J.; Rehfeld, J. F.; Stadil, F. (Bispebjerg Hosp., Copenhagen, Denmark). *Gut* 15(8):622-625, 1974.

Serum gastrin concentrations and gastric acid secretion were measured during infusion of saline and calcium gluconate in 9 patients (8 men and 1 woman, aged 22-60 yr) who had undergone antrectomy for duodenal or prepyloric ulcer at least 3 months prior to examination. Five of the patients had a gastroduodenostomy (Billroth I) and 4 had a gastrojejunostomy (Billroth II). Saline was administered by constant i.v. infusion (flow 30 ml/hr) for a control period of 2 hr. Calcium gluconate was infused over the next 2 hr with a flow of 30 ml/hr, delivering 4 mg Ca^{++}/kg/hr. Serum calcium concentrations rose significantly during calcium infusion from 9.8 ± 0.1 to 12.0 ± 0.4 mg/100 ml. The mean basal serum gastrin concentration rose during calcium infusion from 48 ± 4 to 55 ± 6 pgEq/ml. However, analysis of the data of individual subjects showed that this rise could be ascribed to a rise in a single patient. The volume of secretion was unchanged. Acidity decreased slightly during calcium infusion. Acid output also decreased slightly during saline and calcium infusion. Secretory responses during saline and calcium infusion were not influenced by duodenal reflux, as no significant differences in the osmolarity of the gastric juice were noted. Results of this study indicate that the release of antral gastrin is a prerequisite of calcium to stimulate gastric acid secretion in man. However, this does not exclude other effects of calcium on the gastric secretory system.

7783 SERUM GASTRIN AND GASTRIC ACID RESPONSES TO MEALS AT VARIOUS pH LEVELS IN MAN.

(E.) Konturek, S. J.; Biernat, J.; Oleksy, J. (Med. Acad., Krakow, Poland). *Gut* 15(7):526-530, 1974.

Serum gastrin and gastric acid responses to a test meal of 10% peptone were measured in 6 duodenal ulcer patients (aged 20-24 yr) using intragastric titration at pH levels ranging from 5.5 to 1.0. In this way the pH profile for inhibition of serum gastrin release and gastric acid secretion was established. A peptone meal adjusted to pH 5.5 produced an abrupt rise in gastric acid secretion similar to the maximal response to histamine. A graded decrease of pH of the peptone meal to 1.0 resulted in the progressive inhibition of gastric acid secretion and a concomitant suppression of the serum gastrin level. Exogenous secretin given in graded doses ranging from 0.25 to 2.0 U/kg/hr caused a dose-related inhibition of gastric acid secretion and the suppression of serum gastrin level. A significant inhibition of acid secretion occurred at the dose of 0.5 U/kg/hr and inhibition reached about 90% at the dose of 2.0 U/kg/hr. The serum gastrin level decreased to about 50% of control at the dose of 2.0 U/kg/hr. Thus, gastric acid secretion and the rise in serum gastrin levels in response to an experimental meal are less when the gastric contents become more acidic. The pH changes of the gastric content evoked in this study may occur under natural conditions and it is reasonable to expect that in duodenal ulcer patients the gastric inhibitory mechanisms are activated during normal digestion of food. The decrease of gastric acid response to a peptone meal at a low pH was probably due to the suppression of gastrin release and direct inhibition of parietal cells by a low pH.

7784 FAECAL FAT EXCRETION AFTER TRUNCAL, SELECTIVE, AND HIGHLY SELECTIVE VAGOTOMY FOR DUODENAL ULCER. *(E.)* Edwards, J. P.; Lyndon, P. J.; Smith, R. B.; Johnston, D. (Gen. Infirm., Leeds, England). *Gut* 15(7):521-525, 1974.

Fecal fat excretion was measured on a metabolic ward in 16 patients with duodenal ulcer before operation, and in patients who were in good health after truncal vagotomy and pyloroplasty (11 patients), bilateral selective vagotomy and pyloroplasty (9), or highly selective vagotomy without a drainage procedure (12). Excretion of fecal fat was significantly greater in patients after both truncal vagotomy (6.4 g/day) and selective vagotomy with drainage (4.9 g/day) than in patients before operation (3.1 g/day). Fat excretion in highly selective vagotomy patients (3.6 g/day) was little different from that of preoperative patients. The mean interval between operation and the measurement of fecal fat excretion was 30 months in patients with highly selective vagotomy, 44 months after truncal vagotomy plus pyloroplasty, and 67 months after selective vagotomy plus pyloroplasty, but there was no evidence that fecal fat output correlated with the length of time after operation. If steatorrhea is defined as a fecal fat output of more than 6 g/day, 1 of 16 preoperative patients with duodenal ulcer (6%) had steatorrhea, as well as 1 of 12 highly selective vagotomy patients (8%), 1 of 9 patients after selective vagotomy and pyloroplasty (11%) and 5 of 11 patients after truncal vagotomy and pyloroplasty (45%). The results show that preservation of the extragastric vagal fibers is not of crucial importance for the digestion of fat. The main reasons for the increased loss of fecal fat after both truncal vagotomy and selective vagotomy with a drainage procedure are impairment of the milling function of the antrum, and unregulated gastric emptying through the pyloroplasty or gastroenterostomy. Since the amount of fat in the feces is a nonspecific index of malabsorption, the day-to-day losses of protein, minerals, and vitamins in the feces may be less after highly selective vagotomy than after vagotomy with drainage.

7785 A COMPARISON OF GASTRIC EMPTYING BEFORE AND AFTER VAGOTOMY WITH ANTRECTOMY AND VAGOTOMY WITH PYLOROPLASTY. *(E.)* Donovan, I. A.; Gunn, I. F.; Brown, A.; Alexander-Williams, J.; Clark, R. J. (Gen. Hosp., Birmingham, England). *Surgery* 76(5): 729-732, 1974.

The rate of gastric emptying of a 750 ml solution of 10% dextrose in water was studied by a double-dye dilution technique in 23 patients with duodenal ulcer. Nine of these patients were restudied 3 months after vagotomy with antrectomy and 14 were restudied 3 months after vagotomy with pyloroplasty. The volume emptied 10 min after ingestion of the dextrose meal was used as a measurement of initial gastric incontinence or cascading; the time taken for complete emptying of the stomach was thought to represent active muscular gastric emptying. Statistical comparison of preoperative and postoperative results by Student's t test showed that both operations significantly shortened the time for complete emptying of the stomach. However, a significant increase above preoperative levels in the volume of early emptying occurred only after vagotomy with pyloroplasty. After vagotomy with antrectomy, 5 of the 9 patients emptied rapidly, whereas 4 behaved similarly to the way they did before surgery. Rapid early emptying of the meal after either operation correlated with the clinical symptoms of dumping.

7786 PERIPHERAL AND GASTRIC FIBRINOLYSIS IN PEPTIC ULCER PATIENTS. *(E.)* Prokopowicz, J.; Gabryelewicz, A.; Wolosowicz, N.; Puchalski, Z.; Tolloczko, A. (Inst. Med., Bialystok, Poland). *Haematologia (Budap.)* 7(3-4):381-384, 1973.

The plasma fibrinolytic system in 9 gastric, 9 duodenal ulcer patients, and 9 control patients with cholelithiasis without any evident liver lesion was studied using blood collected from peripheral and gastric blood vessels during surgery for cholelithiasis. Euglobulin lysis time was significantly shortened in gastric venous blood but normal in peripheral venous blood. The plasma fibrinogen level was lower in gastric venous blood than in peripheral blood. The activity of both antiplasmins in gastric venous blood was lower than in healthy control subjects. Plasminogen activity was almost the same in both peripheral and gastric venous blood in gastric ulcer patients. Antithrombin activity in patients and controls alike was higher in gastric than in peripheral venous blood, but was highest in ulcer patients. Antithrombin VI activity was higher in peripheral blood in ulcer patients than in controls. These results suggest a possible pathogenic role of fibrinolytic activity in peptic ulcer. Stress, important in peptic ulceration, activates the fibrinolytic system. The activation of gastric fibrinolysis may induce hemorrhage and aid peptic ulcer development. The decrease of the plasma fibrinogen level in gastric venous blood in ulcer patients may result from high euglobulin fibrinolytic activity, which correlates well with the increased antithrombin VI activity. These data indicate that the lower plasma fibrinogen level is due to the moderate increase of euglobulin fibrinolytic activity and not the reverse. The higher concentration of antithrombin VI, the degradation products of fibrinogen and fibrin, in the gastric vein of ulcer patients may disturb platelet aggregation and cause local hemorrhaging. The use of antifibrinolytic therapy is recommended when gastric hemorrhage is complicating peptic ulcer.

7787 PEPTIC ULCER DISEASE: A CLINICAL STUDY IN 73 CHILDREN. *(E.)* Deckelbaum, R. J.; Roy, C. C.; Lussier-Lazaroff, J.; Morin, C. L. (Montreal Children's Hosp., Canada). *Can. Med. Assoc. J.* 111(3):225-228, 1974.

A review was made of 73 children with primary or secondary peptic ulcer disease. Ulcers in patients in whom an underlying disease, a drug, or a toxic substance causally related to peptic ulcer disease could be identified were labeled secondary. Secondary ulcers predominated in the younger age group (1 month to 6 yr). The primary ulcer group comprised 39 duodenal and 9 gastric ulcer patients. Vomiting was prominent in younger patients while pain and bleeding were more common in older children (6-18 yr). A positive family history was obtained in 11 children with primary duodenal ulcers, but in none with gastric ulcers. Primary ulcers were exclusively gastric in the younger age group, duodenal in older children. Most duodenal ulcers (39/53) were primary; most gastric ulcers (12/21), secondary. Primary gastric ulcers occurred in the antrum (5 cases), or pylorus (4). Of the secondary gastric ulcers, 7 were antral, 3 pyloric, and 2 in the body of the stomach. Most duodenal ulcers involved the bulb, but 2 were postbulbar and 1 was in the 3rd part of the duodenum. Bleeding and/or perforation was the common mode of presentation in secondary ulcers. Medical treatment consisting of blood replacement, nasogastric drainage, iced saline lavage, antacids, anticholinergic agents, and diet was used in 53 patients. Surgery was required in 12 primary and 6 secondary cases. Emergency surgery was performed for 6 perforated secondary ulcers and 2 primary ulcers. Follow-up data on 49 patients (34 primary and 15 secondary) showed that 8 children with secondary ulcers died, 5 from the underlying disease and 3 as a direct result of the ulcer. Of the primary ulcer follow-up studies, only 1 of 4 children diagnosed at less than 6 yr of age had recurrent symptoms. However, 19 of 30 older patients suffered recurrence with gastrointestinal bleeding or pain. All 12 primary ulcer patients who were operated on had a straightforward recovery and have remained well. Peptic ulcer diagnosis in children should be considered not only when there is an aggregation of suggestive symptoms, but also under the following conditions: chronic abdominal pain at night or in early morning hours; recurrent vomiting related to eating; anemia, if occult blood occurs in the stools; vague gastrointestinal complaints in a patient with positive family history for duodenal ulcer; and disease associated with stress if the central nervous system is involved or if corticosteroids have been given.

7788 BONE MINERAL AFTER PARTIAL GASTRECTOMY I. *(E.)* Alhava, E. M.; Aukee, S.; Karjalainen, P. (Univ. Centr. Hosp., Kuopio, Finland). *Scand. J. Gastroenterol.* 9(5):463-466, 1974.

The bone mineral density (g/cm^3) of partial gastrectomy patients (55 men and 15 women) was determined 3.3-8.5 yr after surgery and compared with that of coeval persons with healthy bones. In addition, the bone mineral metabolism of these operated patients was studied by comparing the mean pre- and postoperative serum calcium, phosphorus, alkaline phosphatase, and total protein values. The operations consisted of antrectomy, gastroduodenostomy (Billroth I anastomosis) in addition to selective vagotomy. The bone mineral densities of female patients were significantly lower than the corresponding normal values. Women also displayed a statistically significant correlation between the decrease in mineral density and the interval between surgery and the time of measuring. The mineral density of men also declined, but not significantly so. The serum calcium level declined postoperatively, perhaps due to malnutrition, maldigestion, and malabsorption. The serum phosphorus, alkaline phosphatase, and protein levels rose. As the serum protein level rose, the decrease in the calcium content was real. The postoperative increase in the phosphorus level is accounted for by the drop in the calcium level. The changes in the serum calcium and phosphorus levels established in this study gave no indication of the osteomalacia syndrome in which the serum calcium drops and the phosphorus level declines or remains unchanged. The difference between the mineral densities of subjects with healthy bones and patients operated on for ulcer, and possibly the change in the serum calcium, phosphorus and alkaline phosphatase values, may be regarded as signs of post-gastrectomy bone disease.

7789 MUSCLE SPASM IN THE ETIOLOGY OF CHRONIC PEPTIC ULCER. *(E.)* Qvist, G. (Roy. Free Hosp., London, England). *Proc. R. Soc. Med.* 67(5):365-369, 1974.

7790 PATHOGENESIS OF PEPTIC ULCER: A SELECTIVE REVIEW. *(E.)* Skillman, J. J. (Harvard Med. Sch., Boston, Mass.). *Surgery* 76(3):515-523, 1974.

7791 GASTRIC MOTOR ACTIVITY AND GASTRINAEMIA IN DUODENAL ULCER WITH DELAYED GASTRIC EMPTYING. *(E.)* Barbara, L.; Bortolotti, M.; Vezzadini, P.; Tomassetti, P.; Labo, G. (Inst. Med. Pathol. I, Univ. Bologna, Italy). *Rend. Gastroenterol.* 5(3):237, 1973.

7792 MOYNIHAN'S DISEASE? THE DIAGNOSIS OF DUODENAL ULCER. *(E.)* Spiro, H. M. (Yale Univ. Sch. Med., New Haven, Conn.). *N. Engl. J. Med.* 291(11):567-568, 1974.

7793 A STUDY OF GASTRIC MOTILITY AND GASTRINAEMIA FOLLOWING SELECTIVE PROXIMAL VAGOTOMY. *(E.)* Barbara, L.; Vezzadini, P.; Bortolotti, M.; Ciani, P. A.; Serantoni, C.; Agostini, D.; Labo, G. (Inst. Med. Pathol. I, Univ. Bologna, Italy). *Rend. Gastroenterol.* 5(3):236, 1973.

7794 INTRAOPERATIVE GASTRIC ACIDITY AND HIGHLY SELECTIVE VAGOTOMY. *(E.)* Grassi, G.; Orecchio, C. (San Giovanni Hosp., Rome, Italy). *Rend. Gastroenterol.* 5(3):233, 1973.

7795 CLINICAL RESULTS OF PARIETAL CELL VAGOTOMY (HIGHLY SELECTIVE VAGOTOMY) TWO TO FOUR YEARS AFTER OPERATION. *(E.)* Amdrup, E.; Jensen, H. E.; Johnston, D.; Walker, B. E.; Goligher, J. C. (Munic. Hosp., Copenhagen, Denmark). *Ann. Surg.* 180(3):279-284, 1974.

7796 TRUNCAL VAGOTOMY AND PYLOROPLASTY. CRITICAL EVALUATION OF ONE HUNDRED CASES. *(E.)* Dragstedt,-II, L. R.; Lulu, D. J. (VA Hosp., Des Moines, Iowa). *Am. J. Surg.* 128(3):344-346, 1974.

7797 DUMPING-SYNDROME AFTER VAGOTOMY ASSOCIATED SURGERY FOR PEPTIC ULCER. *(Rus.)* Berezov, Iu. E.; Ermolov, A. S.; Udovskii, E. E. (N. N. Pirogov 2nd Moscow Med. Inst., USSR). *Vestn. Khir.* 112(2):23-27, 1974.

7798 CLINICO-ROENTGENOLOGICAL PARALLELS IN EVALUATION OF LONG-TERM RESULTS OF TREATMENT OF SEVERE DUMPING-SYNDROME WITH RECONSTRUCTIVE JEJUNOGASTROPLASTY. *(Rus.)* Budzinskii, L. A.; Samokhvalov, V. I. (S. M. Kirov Milit. Med. Acad., Leningrad, USSR). *Vestn. Khir.* 111(12):3-8, 1973.

7799 CHRONIC ULCER IN A GASTROPLASTY FOR REPLACEMENT OF THE ESOPHAGUS. *(Ger.)* Herzog, K. H.; Frahm, W.; Woithe, G. (Surg. Clin., Univ. Rostock, Germany). *Zentralbl. Chir.* 98(42):1516-1517, 1973.

7800 METABOLIC DISORDERS IN PATIENTS WITH BILLROTH II RESECTIONS. *(Ger.)* Schwamberger, K.; Reissigl, H.; Falser, N. (Surg. Clin., Univ. Innsbruck, Austria). *Zentralbl. Chir.* 98(31):1105-1110, 1973.

7801 PATHOGENESIS AND SURGICAL TREATMENT OF GASTRIC ULCER. *(Sp.)* Charlo, T.; Dovale, M. T.; Vila, R. (Virgen del Rocio Munic. Sanit., Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 43(4):379-394, 1974.

7802 ENDOSCOPIC AND RADIOLOGIC FOLLOW-UP STUDIES OF GASTRIC ULCERS: RECOVERY RATE AND RELAPSE RATE. *(Fr.)* Hara, Y.; Onoshi, K. (Cancer Ctr., Niigata Hosp., Japan). *Ann. Gastroenterol. Hepatol. (Paris)* 9(6):513-521, 1973.

7803 PERSONALITY AND PEPTIC ULCER. *(Pol.)* Bojanowicz, K.; Rybarczyk, Z. (Acad. Med., Lodz, Poland). *Wiad. Lek.* 26(22):2081-2185, 1973.

7804 PEPTIC ULCERATION FROM CHILDHOOD TO OLD AGE. *(Cz.)* Gregor, O.; Mazac, V.; Belska, Z. (Fac. Pediatr. Med., Charles Univ., Prague, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 28(2):85-94, 1974.

7805 RECURRENCE-PREVENTIVE TREATMENT OF PEPTIC ULCER. *(Rus.)* Bondar, Z. A.; Berezina, L. B.; Feklisova, M. E.; Zhavoronkova, L. Iu.; Smirnova, N. K. (I. M. Sechenov 1st Moscow Med. Inst., USSR). *Ter. Arkh.* 46(1):59-64, 1974.

7806 CLINICAL EVALUATION OF THERAPEUTIC ACTION OF THE NEW SOVIET ANABOLIC DRUG "ANDROSTANOSOL" IN PATIENTS WITH PEPTIC ULCER. *(Rus.)* Trusov, V. V.; Vakhrushev, Ia. M.; Oreshkov, T. M. (Izhevsk Med. Inst., USSR). *Ter. Arkh.* 46(1):96-100, 1974.

7807 EFFECTS OF TWO DIFFERENT PATTERNS OF DIET ON THE ACIDITY OF GASTRIC CONTENTS. IMPLICATIONS FOR THE TREATMENT OF PEPTIC ULCER. *(Por.)* Castro, L. de P.; Galizzi Filho, J.; Pessoa, W. (Med. Fac., Fed. Univ. Minas Gerais, Belo Horizonte, Brazil). *Arq. Gastroenterol.* 11(3):151-157, 1974.

7808 THE MOTOR AND SECRETORY FUNCTIONS OF THE RESECTED STOMACH IN PATIENTS WITH PEPTIC ULCER. *(Rus.)* Kit, O. N. (Ternopol Med. Inst., USSR). *Vestn. Khir.* 111(12):8-10, 1973.

See also, 7665, 7666, 7696, 7730, 7754, 7838, 8101.

SMALL INTESTINE

809 WHY ARE SMALL BOWEL TUMORS RARE? AN EXPERIMENTAL MODEL. *(E.)* Calman, K. C. Western Infirm., Glasgow, Scotland). *Gut* 15(7): 52-554, 1974.

transplantable tumor (Gardner lymphosarcoma) was inected either into the submucosa of the stomach or small ntestine (5-6 cm from the ileo-cecal region) of CBA ice, and the incidence of subsequent tumor growth was tudied under conditions which altered the immune status of the host mouse. Normal mice, mice deprived by thymectomy and irradiation (T-cell-deficient mice), and reconstituted mice (prepared as the deprived animals but given a thymus graft) were used. Tumors developed in 65% of normal mice injected in the stomach, whereas tumors developed in 34% of mice injected in the small intestine. Reconstituted animals also showed a significant increase in the number of tumors developing in the stomach compared with those developing in the small intestine. There was even a higher incidence of stomach tumors (92%) in reconstituted animals as compared with controls. In deprived mice the incidence of tumors was the same at each site. It is stressed that the reconstituted animals had received the same dosage of radiation (800 r) as had the deprived animals, yet the presence of a functioning thymus graft restoring the T cell pool resulted in a significant decrease in tumor take in the small intestine. Thus, radiation itself did not alter locally the capacity of the gut to accept tumor challenge. This suggests that local immune responses can suppress the development of tumors of the small intestine. In conditions such as Crohn's disease or celiac disease, a prospective study of the immunological status of the small intestine may indicate which patients are likely to develop subsequent neoplastic change.

7810 SMALL INTESTINAL DISEASE IN T CELL DEFICIENCY. *(E.)* Horowitz, S.; Lorenzsonn, V. W.; Olsen, W. A.; Albrecht, R.; Hong, R. (Univ. Wisconsin Med. Ctr., Madison). *J. Pediatr.* 85(4): 457-462, 1974.

Intestinal lesions are reported in 4 children (3 boys and 1 girl, aged 4 months to 5 yr) with impaired cell-mediated immunity. One child had an isolated T cell defect and 3 had significant B and T cell defects. All 4 patients had a long history of diarrhea and evidence of malabsorption. Giardiasis was not the cause of their diseases. Microscope examination of biopsy material from the proximal small bowel showed the presence of large "foamy" macrophages of the lamina propria. These were most prominent at the tip of the villus with a progressive decrease in their size and their content of vacuoles, lysosomes, and pleomorphic inclusions in more proximal areas of villi. Absorptive cells, except for a small area at the base of the villus, were abnormal. The macrophages varied in size between 100 and 200 μ. It is likely that mucosal structural alterations in these patients accounted in large part for the gastrointestinal symptoms, for the absorptive surface area was reduced with a decreased height of villi and a reduction in the length of the microvilli. Although 3 of the 4 children had impairment of humoral as well as cell-mediated immunity, it is suggested that the intestinal disease in each was more related to the defect in cellular immunity. The presence of "foamy" macrophages containing numerous pleomorphic inclusions suggests the possibility of a macrophage abnormality. Since large vacuolated macrophages have been described in Whipple's disease and in chronic granulomatous disease, the possibility of a common thread of defective host defense and gastrointestinal malfunction in these 3 conditions is suggested.

7811 MASSIVE GASTROINTESTINAL HEMORRHAGE FROM A CARCINOID TUMOR OF THE ILEUM: REPORT OF A CASE. *(E.)* Burney, R. E.; Standard, J. E. (Yale-New Haven Med. Ctr., Conn.). *Conn. Med.* 38(9):457-458, 1974.

Acute, massive hemorrhage was the presenting symptom in a 71-yr-old man with a carcinoid tumor of the ileum. The patient's history included hypertension and cardiomegaly; he had been taking digoxin (0.25 mg/day) as his only medication. Transfusions of whole blood and packed cells were begun. Upper gastrointestinal series and barium enema were within normal limits, as was sigmoidoscopy. A selective superior mesenteric arteriogram did not locate the site of bleeding. Abdominal exploration showed gross blood present in the mid-ileum, throughout the rest of the small bowel, and in the colon. A 1-cm tumor mass was manually located on the antimesenteric border of the mid-ileum, causing visible kinking of the small bowel wall at that point. Segmental resection was performed followed by resection of a wider area of the small bowel and mesentery when the diagnosis of carcinoid tumor was made. It is stressed that a careful, methodical palpation of the small bowel is essential in a case of gastrointestinal bleeding of undetermined origin.

7812 ARTICULAR COMPLICATIONS IN OBESE PATIENTS AFTER JEJUNOCOLIC BYPASS. *(E.)* Mir-Madjlessi, S. H.; Mackenzie, A. H.; Winkelman, E. I. (Cleveland Clin., Ohio). *Cleve. Clin. Q.* 41(3):119-126, 1974.

Jejunocolic shunt was performed on 27 patients (19 women and 8 men, aged 22-47 yr) for massive obesity. The jejunum was transected 76 cm from the ligament of Treitz. The proximal end was anastomosed end-to-side to the mid-transverse colon, in one case to the ascending colon. In 15 cases the distal jejunum was brought to the abdominal wall. A silastic tube was secured to it, making a jejunostomy available for fluid and electrolyte replacement. Six patients died 10 days to 62 months after surgery. Thirteen patients had take-down of their jejunocolic shunts 9 to 135 months postoperatively. Weight loss was particularly marked in the 12th to 18th month postoperatively. Postoperative complications included dehydration, electrolyte imbalance, hypocalcemia, hypomagnesemia, hypoprothrombinemia, postural hypotension, tetany, joint symptoms, anemia, cholelithiasis, and nephrolithiasis. Liver abnormalities included fatty metamorphosis, nutritional cirrhosis, and fatal hepatic failure. Articular symptoms developed in 8 patients (7 women and 1 man) as early as 2 months and as late as 33 months postoperatively. Joints with pain or synovitis were: ankles in 8 patients, wrists in 7, knees in 7, hips in 6, shoulders in 5, fingers in 5, elbows in 4 and neck in 1. Objective findings of arthritis were present in only 4 patients. Migratory polyarthralgias associated with chills and fever appeared in 2 patients; 3 also had diffuse myalgias. The duration of symptoms varied from 3 to 23 months. The course of joint disease was benign in all patients and without any residual deformity. Synovial fluid obtained from 2 patients was noninflammatory. The arthralgias were modified with analgesic treatment, but 2 patients required ACTH or corticosteroids to relieve arthritic manifestations. In 1 patient the arthritic pain was relieved only after take-down of the shunt. In 2 others restitution of the normal bowel continuity for other reasons resulted in the disappearance of symptoms.

7813 CYTOLOGICAL FINDINGS IN CHRONIC NON-SPECIFIC DUODENITIS. *(E.)* Cheli, R.; Aste, H.; Nicolo, G.; Ciancamerla, G. (San Martino Hosp., Genoa, Italy). *Endoscopy* 6(2):110-115, 1974.

Duodenal histological and cytological specimens from 28 patients (18 men and 10 women, aged 18-68 yr) with chronic nonspecific duodenitis and 20 controls (12 men and 8 women, aged 22-45 yr) were obtained with a 2-way abrasive tube. Of the patients with nonspecific chronic duodenitis, 7 had irritable colon, 4 had chronic pancreatitis, 8 had hiatal hernia, and 9 complained of upper dyspeptic symptoms without demonstrable pathology. The cytological material from these patients showed abundant inflammatory cells, particularly lymphocytes, plasma cells, histocytes and neutrophils. Enterocytes showed shortened longitudinal diameter with values around 16-18 μ. The brush border was thinner or had disappeared. Cytoplasm contained opically empty vacuoles which incised and divided remaining protoplasmic material. The goblet cells were numerically increased and showed signs of a sharp activity. The mucoid cells were numerically increased, but did not reveal particular morphological differences in comparison with the cells present in normal mucosa. The cytological findings were in accord with the histological picture of duodenitis, especially atrophic duodenitis, where cytological alterations were consistently present. The abnormalities were also seen frequently (70% of cases) in superficial duodenitis. The results indicate that cytology is a useful tool in the diagnosis of duodenitis.

7814 DELAYED INTUSSUSCEPTION. *(E.)* Ginzburg, L.; Friedman, I. H. (Beth Israel Med. Ctr., New York, N.Y.). *N.Y. State J. Med.* 74(11): 2009-2013, 1974.

Case histories are presented for 3 of 8 patients with clinical evidence of subacute or chronic intestinal obstruction subsequent to apparently uncomplicated removal of a long intestinal tube used for treatment of nonstrangulating obstructions of the small intestine. The outstanding symptoms were vomiting and intestinal cramps. Distention was not remarkable. A Cantor (single lumen) tube was used for management of the obstruction in all 3 cases. In 1 of 2 patients with continuous Cantor-tube drainage, barium study demonstrated definite jejunal obstruction. Eight weeks earlier a Miller-Abbot (double lumen) tube had been passed through this patient prior to a left hemicolectomy for a neoplasm of the large intestine. In the 2nd patient, barium study after laparotomy showed obstruction of the distal duodenum but did not preclude the possibility of a superior mesenteric artery syndrome. Exploration of both patients revealed an antegrade jejunojejunal intussusception which was resected. In the 3rd patient, the Cantor tube was inserted prior to a right hemicolectomy for a leiomyoma of the terminal ileum. A diatrizoate study on the 6th postoperative day showed no obstruction and the patient was discharged. Upon readmittance 11 days postdischarge, abdominal x-rays revealed numerous dilated loops of small intestine. A diatrizoate study after insertion of a Cantor tube showed prompt passage of contrast material but persistence of a dilated proximal loop. The patient was explored and an antegrade jejunal intussusception was found. None of these intussusceptions could be completely reduced due to the presence of fibrinous adhesions. The pathological basis for the observed obstruction was the development of a propulsive, isoperistaltic, irreducible intussusception induced by the intestinal tube itself.

7815 VITAMIN B_{12} DEPLETION IN OBESE PATIENTS TREATED WITH JEJUNOILEAL SHUNT. *(E.)* Juhl, E.; Bruusgaard, A.; Hippe, E.; Korner, B.; Quaade, F.; Baden, H. (Frederiksberg Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(6):543-547, 1974.

In 10 obese patients treated with intestinal bypass (37 cm of proximal jejunum anastomosed end-to-side to 13 cm of distal ileum), serum vitamin B_{12} gradually declined from a preoperative value of 450 ng/liter to 160 ng/liter after 24 months. During the same 2-yr period intestinal absorption of vitamin decreased as evaluated by the Schilling test. Stimulation of gastric secretion with histamine revealed normal production of acid and intrinsic factor. In serum the B_{12}-binding capacity was normal, and no intrinsic factor antibody could be demonstrated. In another group of 5 patients, quantitative cultures from the proximal jejunum showed an abnormal amount of bacteria. The abnormal proliferation of bacteria, predominantly *E. coli*, was confirmed by the postoperative appearance of deconjugated bile acids in duodenal aspirate. Schilling test values in these 5 patients fell markedly after the bypass operation but rose after 4 days of treatment with tetracycline. The results indicate that the vitamin B_{12} depletion was due not only to a reduced absorptive capacity in the remaining ileum but also to the appearance of intestinal bacteria utilizing vitamin B_{12}. A supplement of parenteral vitamin B_{12} is mandatory in this type of bypass operation.

7816 HISTOPATHOLOGICAL AND RADIOLOGICAL APPEARANCES OF DUODENUM IN GIARDIASIS. *(E.)* Nath, S.; Sehgal, A. K.; Chawla, L. S.; Chhuttani, P. N.; Broor, S. L. (Postgrad. Inst. Med. Educ. Res., Chandigarh, India). *Indian J. Med. Res.* 62(5):719-725, 1974.

Twenty-three patients with giardiasis in whom the parasite was demonstrated in stools as well as in the duodenal aspirate were studied to detect pathological changes in the duodenum. Duodenal biopsy was done by Rubin's multipurpose intestinal biopsy tube from the third part of the duodenum under fluoroscopic control. Non-flocculating barium was used for the radiological examination of the duodenum. Biopsy of giardiasis patients revealed normal villi in 10 cases, while Grade I change was detected in 8 and Grade II in 5 cases. In no case was Grade III change observed. Increased mitotic figures were noted in both the grades but were more associated with Grade II change. Determinations of the height of villi, depth of crypts, villous crypt ratio, total mucosal thickness, epithelial height, cellular infiltration in lamina propria and mitotic index showed statistically significant difference only in the values of mitotic index and cell count in the lamina propria which were both increased in the giardiasis group. Radiological study showed that 12 cases (52.5%) had increased mucosal fold thickness. Increased duodenal hurry and irritability was noted in 17 cases (73.9%) and in some it was so marked that despite repeated attempts, no picture of the duodenal bulb could be taken. After successful treatment, only 5 patients (21.7%) showed abnormal mucosal fold thickness and only 3 patients (13%) showed increased duodenal irritability. There was a statistically significant negative correlation between the histological and radiological appearances. As the height of the villi decreased, the mucosal fold thickness increased. It is suggested that *Giardia* can cause morphological abnormalities amounting to duodenitis.

7817 NUTRITIONAL ADAPTATION AFTER SMALL BOWEL RESECTION IN RATS.

(E.) Young, E. A.; Weser, E. (Univ. Texas Med. Sch., San Antonio). *J. Nutr.* 104(8):994-1001, 1974.

Body weight, growth rate, energy intake and energy efficiency were measured in male Sprague-Dawley rats with a 50% resection of either the distal (8 rats) or proximal (5 rats) small intestine, and correlated with adaptive weight changes in the remaining bowel. The weights of unoperated controls (12 rats) were significantly greater than sham-operated (6 rats) or resected rats during weeks 1-3 following operation. However, the rate of weight gain for operated animals was greater during these 3 weeks, suggesting an adaptive response whereby operated rats used calories more efficiently thus compensating for reduced energy intake during the week of surgery as well as for physiological stress. This increased energy efficiency could also result from diversion of energy from activity to tissue regeneration. Proximally resected rats continued to show greater energy efficiency through week 4, after which all 4 groups had similar energy efficiency. Energy intake of all operated rats was reduced 25% during the week after surgery. By the second week, energy intake was similar in all groups. When energy intake is compared between operated groups, distally resected rats consistently consumed more energy than proximally resected rats between weeks 3 to 9. At 8 weeks, distally resected animals consumed greater energy intake than any other group, indicating an important difference in adaptation. Distally resected animals may require greater ingestion of calories to maintain a normal growth pattern. When bowel dry weights/cm length were compared in all groups, hyperplasia was noted in distal remnants of proximally resected rats, which may be related to an increased nutrient load presented to this region of the gut. The significant hyperplasia of this region of the bowel provided enhanced absorption and allowed a growth pattern comparable to control animals to be maintained. This adaptation may be diminished by controlling food intake to smaller nutrient load cycles/unit of time, or by providing total energy requirements by i.v. alimentation. Normal growth is primarily achieved by greater caloric intake in distally resected rats, and probably enhanced absorption by the hyperplastic distal remnant in proximally resected animals.

7818 EXTERNAL PANCREATIC FUNCTION FOLLOWING THREE TYPES OF INTESTINAL SHUNT OPERATION FOR OBESITY.

(E.) Dano, P.; Lenz, K. (Rigshosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(5):451-455, 1974.

Intestinal shunt operations were performed as a treatment for morbid obesity in 36 patients. The external pancreatic function following a stimulation meal was investigated before surgery, 6-12 and 12-24 months after operation. In each patient 48 cm of small intestine was preserved, but the ratio of functioning jejunum/ileum was different: Type I 36 cm/12 cm; Type II 24 cm/24 cm; and Type III 12 cm/36 cm. The pancreatic function decreased in all 3 types during the first postoperative period. The reduction was least in Type III operated patients. In the second postoperative period there was an increase in pancreatic function in Type I and II operated patients, but a sustained reduction in Type III operated patients. It is suggested that the reduction of pancreatic function in the first postoperative period was due to malabsorption, and the sustained reduction in Type III operated patients in the second postoperative period was due to impaired release of stimulating hormones from the bypassed jejunum. The results indicate that a significant, but transient, reduction of pancreatic function regularly occurs after therapeutical intestinal bypass.

7819 CALCIUM ETHYLENEDIAMINETETRAACETATE TOXICITY IN THE RAT: SEQUENTIAL LIGHT- AND ELECTRON-MICROSCOPIC STUDIES ON CHELATE-INDUCED ENTEROPATHY.

(E.) Braide, V. B. C.; Aronson, A. L. (New York State Vet. Coll., Cornell Univ., Ithaca). *Toxicol. Appl. Pharmacol.* 30(1):52-62, 1974.

The effects of calcium ethylenediaminetetraacetate (CaEDTA) infusion on small intestinal morphology and permeability were studied in 27 Long-Evans rats (including 11 controls). All rats were infused i.v. for a total of 72 hr. Rats treated with CaEDTA received the drug for the last 12-48 hr (following infusion of a 0.9% NaCl solution), at a rate of 6 mM/kg/24 hr. Light microscopy of small intestinal tissue revealed degenerative changes in duodenal crypt cells; electron microscopy revealed high-amplitude swelling of mitochondria as early as 12 hr following the start of CaEDTA infusion. The mitotic index and cell population density was markedly diminished by hour 24. At this time the villus structure was still intact. Enhanced permeability of the intestine to ^{51}Cr labeled CaEDTA occurred between 24 and 36 hr and correlated with the loss of villous epithelium. This study supports the work of others suggesting that inhibition of DNA synthesis is an important biochemical lesion in CaEDTA-induced enteropathy. The occurrence of high-amplitude mitochondrial swelling suggests that interference with the energy supply in the cell may be a contributing factor toward inhibition of the synthesis of DNA.

7820 ANAEROBIC BACTERIA AND DECONJUGATED BILE SALTS IN THE UPPER SMALL INTESTINE OF INFANTS WITH GASTROINTESTINAL DISORDERS. *(E.)* Challacombe, D. N.; Richardson, J. M.; Edkins, S. (Inst. Child Hlth., Univ. Birmingham, England). *Acta Pediatr. Scand.* 63(4):581-587, 1974.

Deconjugated bile salts have been reported in the upper small intestine of infants with protracted diarrhea and secondary monosaccharide intolerance. As deconjugated bile salts inhibit monosaccharide transport mechanisms in the small intestine of experimental animals both *in vivo* and *in vitro*, they may also cause monosaccharide malabsorption in these infants. In this study, 30 infants and children were divided into 3 clinical groups: 1) 7 infants with chronic diarrhea; 2) 7 postsurgical infants; and 3) 16 infants and children with other gastrointestinal disorders. The infants were challenged with oral sugar loads to detect patients with glucose or lactose intolerance. The duodenal juice of all infants with protracted diarrhea was examined by thin layer chromatography and fluorimetry for deconjugated bile salts and cultured anaerobically for bacteria with known deconjugating properties. In addition, duodenal juice from infants and children from group 3 was similarly studied. Deconjugated bile salts and obligate anaerobic bacteria were associated in only 2 out of 30 samples of duodenal juice, 1 from an infant with secondary lactose intolerance, and 1 from an infant with unexplained failure to gain weight. The absence of deconjugated bile salts in the duodenum of 2 infants with secondary monosaccharide intolerance and from other infants with protracted diarrhea does not support the suggestion that the action of deconjugated bile salts on the small intestinal mucosa is an important causative factor in these disorders.

7821 THE MECHANICAL ACTIVITY OF THE HUMAN JEJUNUM. *(E.)* Torsoli, A.; Corazziari, E.; Delle Fave, G. F.; Anzini, F. (Med. Clin. II, Univ. Rome, Italy). *Rend. Gastroenterol.* 5(3):2406, 1973.

7822 THE TRANSPORT OF BICARBONATE BY THE SMALL INTESTINE OF A PATIENT WITH PROXIMAL RENAL TUBULAR ACIDOSIS. *(E.)* Schoeneman, M.; Lifshitz, F.; Diaz-Bensussen, S. (Univ. Maryland Hosp., Baltimore, Md.). *Pediatr. Res.* 8(8):735-739, 1974.

7823 ULTRASTRUCTURAL CHANGES IN JEJUNAL EPITHELIAL CELLS IN PELLAGRA. *(E.)* Theron, J. J.; Prinsloo, J. G.; Mekel, R. C. P. M. (Univ. Pretoria Med. Sch., South Africa). *S. Afr. J. Sci.* 70(2):51-52, 1974.

7824 ROLE OF ENDOTOXIN AND BACTERIA IN LONG-TERM SURVIVAL OF PRESERVED SMALL-BOWEL ALLOGRAFTS. *(E.)* Toledo Pereyra, L. H.; Raij, L.; Simmons, R. L.; Najarian, J. S. (Dept. Surg., Univ. Minnesota, Minneapolis). *Surgery* 73(3):474-481, 1974.

7825 SERUM IMMUNOGLOBULINS AND COPROANTIBODY FORMATION IN INFANTS AFTER ARTIFICIAL INTESTINAL COLONIZATION WITH E. coli 083 AND ORAL LYSOZYME ADMINISTRATION. *(E.)* Lodinova, R.; Jouja, V.; Wagner, V. (no affil.). *Acta Paediatr. Scand.* 63(4):651, 1974.

7826 Staphylcoccus aureus: SOME HOST-PARASITE INTERACTIONS. *(E.)* Kapral, F. A. (Ohio State Univ. Coll. Med., Colombus). *Ann. NY Acad. Sci.* 236: 267-276, 1974.

7827 CONGENITAL MESOCOLIC (PARADUODENAL) HERNIA. EMBRYOLOGIC BASIS OF REPAIR. *(E.)* Willwerth, B. M.; Zollinger, Jr., R. M.; Izant, Jr., R. J. (Univ. Hosp. Cleveland, Ohio). *Am. J. Surg.* 128(3): 358-361, 1974.

7828 FREE PERFORATION COMPLICATING PRIMARY ADENOCARCINOMA OF THE JEJUNUM. *(E.)* Meyers, S.; Feinman, L. (VA Hosp., Bronx, N. Y.). *Am. J. Dig. Dis.* 19(9):850-854, 1974.

7829 RECURRENT JUVENILE DUODENAL POLYPOSIS. *(E.)* Bhasin, R. P.; McAlindon, J. A.; Elliott, H. B.; Boskar, D. F. (no affil.). *J. Pediatr. Surg.* 9(4): 553-554, 1974.

7830 FIBERENDOSCOPY OF THE CECUM AND TERMINAL ILEUM. *(E.)* Gaisford, W. D. (Latter-Day Saints Hosp., Salt Lake City, Utah). *Gastrointest. Endosc.* 21(1):13-18, 1974.

7831 SUBTOTAL RESECTION OF THE SMALL INTESTINE IN PIGLETS AND PARENTERAL NUTRITION: PRELIMINARY RESULTS. *(E.)* Ricour, C.; Harouchi, A.; Parc, R.; Orvoen, E.; Pellerin, D. (Children's Hosp., Paris, France). *Digestion* 10(3):239, 1974.

7832 INTESTINAL RESECTION IN CHRONICALLY BLOOD-CROSSED TWIN PIGS: BLOOD-CARRIED FACTOR(S). *(E.)* Laplace, J. P. (Lab. Physiol. Nutr., CNRZ, INRA, Jouy-en-Josas, France). *Digestion* 10(3):229, 1974.

7833 INTESTINAL PEPTIDE HYDROLASE ACTIVITY IN HUMAN JEJUNAL BIOPSY MATERIAL: A SIMPLE ASSAY. *(Ger.)* Caspary, W. F. (Med. Clin., Univ. Gottingen, Germany). *Klin. Wochenschr.* 52(7):341-344, 1974.

7834 SUBTOTAL RESECTION OF THE SMALL INTESTINE FOR NONVITAL INDICATIONS. *(Ger.)* Vinz, H. (Med. Acad., Magdeburg, Germany). *Zentralbl. Chir.* 98(31): 1116-1121, 1973.

7835 PRESENT POSITION OF SURGERY FOR ILEUS IN THE NEWBORN IN THE REGION OF THE JEJUNUM, ILEUM, AND COLON. *(Ger.)* Flach, A. (Surg. Clin., Univ. Tubingen, Germany). *Munch. Med. Wochenschr.* 116(22): 1119-1122, 1974.

7836 BLEEDING LEIOMYOMA OF THE SMALL INTESTINE. *(Rus.)* Zhupan, V. F.; Satsukevich, B. N. (S. M. Kirov Milit. Med. Acad., Leningrad, USSR). *Vestn. Khir.* 112(1):124-125, 1974.

7837 A RARE CASE OF GRANULOMATOUS ENTERITIS: Histoplasma duboisii? *(Fr.)* Louvel, A.; Tran-Vinh-Hien; Lapierre, J.; de Saint-Maur, P. O.; Holler, C.; Keita, M.; Abelanet, R. (Cochin Hosp., Paris, France). *Arch. Anat. Pathol. (Paris)* 22(2): 153-156, 1974.

7838 RELATION BETWEEN DUODENAL DYSKINESIA, PEPTIC ULCER, AND BILIARY DISORDERS WITH OR WITHOUT CHOLELITHIASIS. *(Fr.)* Kapandji, M. (no affil.). *Ann. Gastroenterol. Hepatol. (Paris)* 9(6):555-574, 1973.

7839 COMMENTS ON PEUTZ-JEGHERS SYNDROME: THREE ORIGINAL CASES. *(Sp.)* Gaspar Fuentes, A.; Moreno Amezcua, J.; Campos Tarrech, J. M.; Castells Tejon, E.; Fernandez Burgui, J. L.; Ruiz Rosello, J.; Gomez Perez, J. (Francisco Franco Munic. Sanit., Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 43(3): 261-274, 1974.

See also, 7352, 7636, 7666, 7667, 7671, 7721, 7744, 7753, 7846, 7900, 7901, 7902, 7911, 7912, 8068, 8106, 8109, 8122, 8127, 8128.

SMALL INTESTINE

Malabsorption

7840 HL-A8 AND THE IMMUNE RESPONSE TO GLUTEN. *(E.)* Scott, B. B.; Rajah, S. M.; Swinburne, M. L.; Losowsky, M. S. (St. James's Hosp., Leeds, England). *Lancet* (7877):374-377, 1974.

Serum antibodies to gluten and milk were correlated with the presence of the histocompatibility antigen HL-A8 in 124 patients and healthy controls. The patients were diagnosed as follows: cirrhosis (22), chronic active hepatitis (17), other liver disease (11), definite celiac disease (15), probable celiac disease (8), malabsorption (9), glomerulonephritis (5), Crohn's disease (5), chronic pancreatitis (4), ulcerative colitis (3), ankylosing spondylitis (1), and sarcoidosis (1). Gluten antibodies were present at significantly higher titer in the HL-A8 positive subjects. Of the 58 HL-A8 positive subjects, 15 (26%) had gluten antibodies at a titer greater than 1/128 compared with only 2 (3%) of the 66 HL-A8 negative subjects. Patients with celiac disease had the highest antibody titers to gluten, although most were on a gluten-free diet. Among the nonceliac subjects, high gluten antibody titers were mainly confined to patients with cirrhosis or chronic active hepatitis. There was a tendency for milk antibodies to be higher in subjects who were HL-A8 negative. Taking both types of antibody together gave a very good discrimination between HL-A8 negative and HL-A8 positive subjects. These results show that in man the HL-A system is related to the pattern of immune response to certain dietary antigens.

7841 AN EVALUATION OF PREDNISOLONE, TETRACYCLINE AND HIGH PROTEIN DIET FOR THE THERAPY OF IDIOPATHIC TROPICAL MALABSORPTION SYNDROME. (ITMS). *(E.)* Tandon, B. N.; Bose, S. L.; Saikia, B. (All India Inst. Med. Sci., New Delhi). *Indian J. Med. Res.* 62(5):704-711, 1974.

Five patients with idiopathic tropical malabsorption syndrome received a high-protein diet and tetracycline (250 mg, 4 times/day) for 6 weeks. An additional 9 patients with idiopathic tropical malabsorption syndrome received a high-protein diet with tetracycline (1 g/day for 2 weeks) and prednisolone (30 mg/day for the 1st week, 20 mg/day for the 2nd week, and 10 mg/day for the subsequent 4 weeks). The 5 patients receiving tetracycline and diet therapy showed clinical improvement with a feeling of well being, increased appetite, decreased frequency of bowel movements and improvement in the character of stool, and an average 3 kg gain in weight. D-xylose, abnormal in all 5 before treatment, became normal in 2 cases. None of 4 patients with steatorrhea reverted to normal, although fat absorption improved. One of 3 patients with abnormal jejunal histology reverted to normal; the remaining 2 showed improvement. The mitochondrial marker enzyme succinic-dehydrogenase, reduced in 4 patients, showed no improvement. The 9 patients receiving diet, tetracycline, and prednisolone, showed striking clinical recovery and an average weight gain of 5 kg. The intestinal absorption functions greatly improved. D-xylose excretion normalized in 7 of 8 patients. Of 7 patients with steatorrhea, 2 acquired normal fat absorption. Vitamin B_{12} malabsorption normalized in 3 of 4 cases. However, 2 patients who had normal vitamin B_{12} absorption at the start of treatment showed poor absorption at its conclusion. Only 1 of 6 patients with abnormal jejunal biopsy recovered to normal. Brush-border enzyme, alkaline phosphatase, was reduced in 2 patients and improved in each. Succinic-dehydrogenase did not show recovery in any patient. Thus, treatment with high-protein diet and tetracycline resulted in a partial recovery. Addition of prednisolone resulted in a better clinical recovery and more significant improvement of absorptive functions. However, neither regimen cured the disease. Idiopathic tropical malabsorption syndrome may be an immune deficiency disease which allows bacterial colonization in the small bowel with consequent clinical and biochemical features of malabsorption.

7842 APATHETIC THYROTOXICOSIS CAUSING GASTROINTESTINAL MALABSORPTION. *(E.)* Sheehy, T. W.; Allison, T. M. (Univ. Alabama Sch. Med., Birmingham). *JAMA* 230(1):69-71, 1974.

A 52-yr-old black woman with a 26-yr history of diabetes mellitus was hospitalized complaining of intermittent diarrhea for 3 months. Over the previous 18 months her weight dropped from 120 to 60 lb. despite a good appetite. During this weight loss her diabetes became less difficult to control and she stopped taking insulin. Proctosigmoidoscopy, barium enema, barium swallow with small intestine follow-through, and an x-ray film series of the gallbladder were normal. Increased gastrointestinal motility was demonstrated by the appearance of contrast material in the ileocecal area within 15 min of ingestion and by continuous repetitive type II gastric waves. A small-bowel biopsy specimen was normal. Bacterial cultures of jejunal aspirates did not yield significant growth. No fecal pus cells or parasites were seen. Steatorrhea remained massive even when dietary fat intake was restricted to 100 g or less/day. Substitution of dietary medium-chain triglycerides, which are absorbed directly from the lumen without need of hydrolysis, bile salts, or intracellular reconstitution, led to considerable reduction in both steatorrhea and fecal fluid loss. Pancreatic insufficiency or thyrotoxicosis was suspected due to tachycardia, apathy, hurried intestinal transit, and absence of a jejunal lesion. No improvement occurred with pancreatic replacement therapy and a secretin test was normal. Thyroid function tests led to the diagnosis of thyrotoxicosis. Appropriate therapy for thyrotoxicosis (50 mg 3,5,3'-triiodothyronine, 3 times/day followed by Na ^{131}I (6 mC p.o.) led to return of normal intestinal function and resurgence of diabetic symptoms requiring use of insulin.

7843 MULTIPLE JEJUNAL STRICTURES ASSOCIATED WITH MEGALOBLASTIC ANAEMIA AND MYELOPATHY. *(E.)* Elsborg, L. (Arhus County Hosp., Denmark). *Acta. Med. Scand.* 196(1-2):127-131, 1974.

An exploratory laparotomy was performed on a 26-yr-old male due to a 10-yr history of continuous progression of his symptoms, including malabsorption and neurological defects suggestive of subacute combined degeneration of the spinal cord. The laparotomy revealed an intestinal stenosis situated about 75 cm distal to the Trietz ligament, followed by a dilated segment and then by another stenosis. Proximal to the stenosed segments the jejunum and duodenum were markedly dilated. The intestinal wall was hypertrophied, and the segment showed vigorous peristalsis. The stenosed portions of the intestine, 35 cm in length, were resected, and an end-to-end anastomosis between the normal appearing jejunum and the dilated proximal intestinal segment was carried out. In spite of optimal substitution therapy with vitamin B_{12} prior to surgery, the bone marrow was megaloblastic, which was ascribed to folate deficiency resulting from malabsorption of folic acid. A possible association between neurological lesions and folate deficiency was not established for there may also have been a deficiency of other nutritional factors of significance for nervous tissues. The malabsorption syndrome associated with multiple strictures of the jejunum carries a grave prognosis and may lead to severe disability of the patient. The treatment of choice is surgical resection.

7844 IDIOPATHIC HYPOPARATHYROIDISM AND STEATORRHEA: A NEW AID IN MANAGEMENT. *(E.)* Lorenz, R.; Burr, I. M. (Vanderbilt Univ. Sch. Med., Nashville, Tenn.). *J. Pediatr.* 85(4):522-525, 1974.

Metabolic studies of fat and calcium balance and details of successful therapy are described for a white female patient with hypoparathyroidism and hypocalcemia associated with steatorrhea. At 6 yr of age idiopathic hypoparathyroidism was diagnosed. Therapy was started with vitamin D, 50,000 U and calcium lactate, 900 mg/day with normal serum calcium levels. Evidence of malabsorption became apparent at age 13. Stool fat excretion was approximately 7% of intake. Liver functions were mildly abnormal: SGPT 150 KU, serum bilirubin 1.8 mg/100 ml. Vitamin D dosage was increased (200,000 U/day) and accompanied by calcium (3 g/day) and oral supplements of magnesium acetate (500 mg/day). Within 2 weeks recurrent carpopedal spasm prompted hospital readmission; hypocalcemia and steatorrhea were present. Both proved difficult to manage, suggesting that patients with steatorrhea and hypoparathyroidism with hypocalcemia may enter a phase whereby low concentrations of serum calcium predispose to further steatorrhea which in turn aggravates the hypocalcemia. A beneficial effect on fat balance was achieved immediately after institution of a medium-chain triglyceride diet containing 50% of fat by weight. At this time calcium balance became positive. This diet was used on the theory that fat given as medium-chain triglycerides, requiring no intraluminal digestion for absorption, would reduce fecal fat losses and thus calcium losses secondary to saponification. The medium-chain triglyceride diet appears to contribute to the relatively rapid decrease in the need for parathormone, vitamin D, and calcium supplements. Thus, while maintenance of normal serum calcium levels alone may be sufficient to break the cycle of hypocalcemia aggravated by steatorrhea, the additional use of a diet containing medium-chain triglycerides appears to be an aid in management.

7845 COEXISTENCE OF DIABETES MELLITUS AND CELIAC DISEASE. *(E.)* Thain, M. E.; Hamilton, J. R.; Ehrlich, R. M. (Hosp. Sick Children, Toronto, Canada). *J. Pediatr.* 85(4):527-529, 1974.

A study was made of 6 children, hospitalized for the diagnosis and early care of either diabetes mellitus or celiac disease. Of the 6 children, 5 were known to have diabetes before celiac disease was diagnosed, but in retrospect they all had subtle intestinal symptoms dating back at least to the onset of diabetes. The clinical manifestations of celiac disease were common to all: foul, bulky stools; episodic diarrhea; abdominal distention; anorexia; and poor weight gain. All children had normal concentrations of serum cholesterol, triglycerides, and lipoproteins. Steatorrhea with fat excretions of 10-54% of dietary intake was present in 5; 1 patient excreted only 8% of dietary fat. Biopsy of the intestinal mucosa was typical of celiac disease, as was clinical response to dietary therapy. After treatment with a gluten-free diet, the intestinal symptoms improved rapidly and all children gained weight. Fat absorption was reassessed in 3 children and found to be normal. Control of diabetes improved and the number and severity of hypoglycemic episodes declined. Insulin requirement increased in 4 children as absorptive function improved in response to diet. The occurrence of diabetes in approximately 6% of 112 children with celiac disease and the appearance of celiac disease in about 1.5% of 400 cases of diabetes mellitus over an 8 yr period suggests the coexistence of these diseases in children is far greater than in the general population. It is suggested that the two conditions may have a common etiology through an immune factor.

7846 IMMUNOLOGICAL STUDIES OF THE JEJUNAL MUCOSA IN NORMAL SUBJECTS AND ADULT CELIAC PATIENTS.

(E.) Gasbarrini, G.; Miglio, F.; Serra, M. A.; Bernardi, M. (Inst. Special Med. Pathol. Clin. Methodol., Univ. Bologna, Italy). *Digestion* 10:122-128, 1974.

The number of plasma cells containing each of the three principal types of immunoglobulins (IgA, IgG, IgM) in the human jejunal mucosa was determined in 8 adult celiac patients (aged 25-45 yr) and in 8 subjects without any gastrointestinal abnormalities, using immunofluorescent techniques. A statistical comparison of the results showed a particularly significant increase in IgM cells and a less significant increase in the IgG cells in celiac disease. A decrease of the IgA cells was also noted, but was not statistically significant. It is suggested that the decrease in IgA cells may be related to phenomena associated with alterations of the interstitial area, such as edema. The marked increase in IgM cells is extremely significant in that an isolated increase in IgM cell concentration in the jejunum has not yet been determined for any other disease. Further, IgM cell increases have not been identified in other diseases with an immunological etiology. A very high IgG cell count and simultaneously a low IgM count was noted in one particular celiac patient who was not responding to gluten-free diet and who showed serious degradation of the jejunal mucosal structure. A year later, autopsy revealed this patient had intestinal lymphosarcoma and thus suggested a possible connection between a high IgG count coupled with a low IgM count and pre-clinical lymphosarcoma. Similar immunoglobulin cell counts have been found in 2 additional cases of lymphosarcoma associated with celiac disease.

7847 GLUTEN-INDUCED ENTEROPATHY. OSTEOMALACIA AS ITS PRINCIPAL MANIFESTATION.

(E.) Hajjar, E. T.; Vincenti, F.; Salti, I. S. (American Univ. Med. Ctr., Beirut, Lebanon). *Arch. Intern. Med.* 134 (3):565-566, 1974.

7848 IMERSLUND ANEMIA [CHRONIC IDIOPATHIC MEGALOBLASTIC ANEMIA]: CONGENITAL VITAMIN B_{12} MALABSORPTION.

(Ger.) Weippl, G.; Weissenbacher, G. (Pediatr. Clin., Univ. Vienna, Austria). *Helv. Med. Acta* 29(2):119-125, 1974.

7849 HYPOGAMMAGLOBULINEMIA, MALABSORPTION, AND INTESTINAL AND HEPATIC GRANULOMATOSIS.

(Sp.) Vidal Pla, R.; Romero, R.; Vilardell, M.; Brulles, A.; Sarrias, J.; Magrina, N.; Moragas, A. (Munic. Sanit., Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 43(4): 443-450, 1974.

7850 DYSGAMMAGLUBULINEMIA ASSOCIATED WITH NODULAR LYMPHOID HYPERPLASIA OF THE SMALL INTESTINE.

(Por.) Ornellas, A. T.; Gaburri, P. D.; de Souza, A. F. M.; Ladeira, A.; Brandao, C. B. P. A. (Med. Fac., Fed. Univ. Juiz de Fora, Brazil). *Arq. Gastroenterol.* 11 (3):179-182, 1974.

7851 PELLAGRA: CLINICAL AND BIOCHEMICAL DATA.

(Por.) Vannucchi, H.; Campana, A. O. (Coll. Med. Sci. Biol., Botucatu, Brazil). *Arq. Gastroenterol.* 11(3):129-133, 1974.

7852 MALABSORPTION SYNDROME AND PSEUDOOBSTRUCTION OF THE INTESTINE IN PRIMARY AMYLOIDOSIS OF THE CARDIOVASCULAR SYSTEM.

(Ger.) Schulz, H. J.; Reitzig, P.; Lisewski, G.; Dietze, F. (1st Med. Clin., Humboldt Univ., Berlin, Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 33(4/5):233-244, 1973.

See also, 7444, 7458, 7647, 7669, 7758, 7800, 7810, 7815, 7930, 7984, 8084.

LARGE INTESTINE

7853 PREOPERATIVE USE OF ANTIBIOTICS IN COLONIC SURGERY.

(E.) Bridoux, M. (Good Samaritan Hosp. Med. Ctr., Portland, Ore.). *Dis. Colon Rectum* 17(4):487-492, 1974.

A retrospective study of 100 cases of elective colonic surgery was conducted to determine the effectiveness of preoperative antibiotic therapy. Mechanical preparation (restrictive diet and/or laxatives and/or enemas) was given to 98 patients while 80 received preoperative antibiotics (oral and/or systemic). Complications (wound infection, abscess or peritonitis, anastomotic leak or fistula, wound dehiscence, enterocolitis, renal failure, and death or tumor recurrence) occurred postoperatively in 19 patients, with 6 patients having more than one complication; 3 patients died. No complication occurred in patients less than 51 yr old. Of the 20 patients who did not receive preoperative antibiotics, only 1 developed a wound infection, as compared to 18 of 80 (22%) patients who had received an antibiotic plus mechanical preparation. It appears that continued use of conventional preoperative antibiotic preparations for elective colonic surgery is unjustified.

7854 THE EFFECTS OF LOW AND HIGH RESIDUE DIETS ON THE RATE OF TRANSIT AND COMPOSITION OF THE FECES. *(E.)* Parks, T. G. (Dept. Surg., Queen's Univ., Belfast, Northern Ireland). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973,* pp. 369-380.

A technique utilizing ^{51}Cr-labeled sodium chromate and radiopaque pellets has been used to study intestinal transit times in 24 patients with diverticular disease of the colon maintained on a low or high residue diet. Mean transit times were essentially the same, whether estimated with ^{51}Cr-sodium chromate or using radiopaque pellets. When the radiopaque pellet was used, the mean transit rate of patients on a high residue diet was significantly ($P < 0.01$) greater than that of patients on a low residue diet. Patients on the high residue diet also have a greater average stool dry weight (24.3 gm) than did those on the low residue diet (19.7 gm). The frequency of defecation as well as the mean fecal fat excretion were the same for both high and low residue diets.

7855 GASTRIC LESION OF FAMILIAL POLYPOSIS COLI. *(E.)* Utsunomiya, J.; Maki, T.; Iwama, T.; Matsunaga, Y.; Ichikawa, T.; Shinomura, T.; Hamaguchi, E.; Aoki, N. (Tokyo Med. Dental Univ., Japan). *Cancer* 34(3):745-754, 1974.

Fifteen cases of familial polyposis coli occurring in 6 different unselected families were studied. The incidence of gastric polyps among these patients was determined. Clinical studies such as roentgenogram and endoscopic examinations were carried out in 12 cases, the resected stomach was examined in 2, and autopsy material was used in 2. Elevated lesions were found in the stomachs of 10 subjects (66.7%). This was a much higher incidence than that found in a nationwide survey of this disease in Japan (10%). Thus, this disease may not necessarily be localized to the large intestine, and the absence of gastric polyps in other case reports is probably due to insufficient examination of the stomach. It is suggested that these findings could also be influenced by an environmental factor is Japan.

7856 VILLOUS ADENOMA OF THE COLON AND RECTUM: AN ULTRASTRUCTURAL STUDY. *(E.)* Ioachim, N. J.; Delaney, W. E.; Madrazo, A. (St. Vincent's Hosp. Med. Ctr., New York, N.Y.). *Cancer* 34(3):586-596, 1974.

The villous component of 9 human colonic polyps (3 pure villous adenoma and 6 mixed adenomatous and villous adenomas) was studied by light and electron microscopy. Normal colonic mucosa was used as a control. The predominant cell was an undifferentiated epithelial cell resembling those of the base of the crypts in normal colonic mucosa. A minority of these cells differentiated toward goblet cells and absorptive cells. Interdigitations of the plasma membrane with enlarged intercellular spaces were frequently observed and may be related to the loss of water and electrolytes in some of these tumors, suggesting an analogy to changes in the renal tubular plasma membrane in kaliopenic nephropathy. Numerous membrane-bound inter- and intracellular "inclusion bodies" representing degenerated lymphocytes and epithelial cell organelles were commonly found. Viral inclusions were not detected in this material. It appears unlikely that the inclusion bodies observed in villous adenoma represent lysosome-modified vesicles, secondary to absorption of protein and surface mucosubstances.

7857 CARCINOID TUMORS OF THE RECTUM: EXPERIENCE WITH 38 CASES. *(E.)* Grablowsky, O. M.; Ribaudo, J. M.; Ray, J. E. (Ochsner Clin. Ochsner Fdn. Hosp., New Orleans, La.). *Dis. Colon Rectum* 17(4):532-535, 1974.

The clinical and pathologic characteristics of carcinoid tumors of the rectum were studied in 38 patients (25 men and 13 women, aged 28-81 yr) diagnosed and treated over a 23 yr period. Clinically benign tumors were found in 33 patients and 5 had invasive carcinoids with metastasis to regional lymph nodes or the liver. All benign tumors were completely asymptomatic and were discovered on routine rectal and proctoscopic examinations. All patients with malignant tumors had symptoms. Associated rectal tumors (cloacogenic carcinoma and familial polyps) were found in 2 patients. The distinction between carcinoids which are clinically benign and those which are malignant can be made only by determining the extent of invasion of the bowel wall or by evidence of metastasis. The gross size of the tumor is important, since most tumors less than 2 cm in diameter are localized, whereas those 2 cm in diameter or larger are invasive and metastasize. Benign rectal carcinoids should be treated with biopsy and thorough fulguration or local excision. However, invasive tumors should be treated by radical resection whenever possible, since the metastatic lesions are very slow-growing and the patient may remain relatively asymptomatic for long periods.

7858 THE ANATOMICAL PRECURSOR OF COLORECTAL CARCINOMA. *(E.)* Fenoglio, C. M.; Lane, N. (Coll. Physicians Surg., Columbia Univ., New York, N.Y.). *Cancer* 34(3)suppl.:819-823, 1974.

Hyperplastic polyps account for about 90% of all "polyps." They are not neoplasms and are unrelated to either adenomas or carcinomas. Adenomas, which are only 1/10 as common, may occur grossly as adenamatous polyps or papillary adenomas. Whether they are large or small, pedunculated, sessile, or flat, they are true non-invasive neoplasms. Depending on size and probably because of a sessile mode of growth, intramucosal carcinoma and/or "early" invasive cancer may be observed in adenomas. On the other hand, "early" cancer, defined as intramucosal carcinoma with or without microinvasion, does not seem to occur unassociated with adenoma. Since colorectal carcinoma is so common, many examples of "early" cancer should be found if the majority of ordinary adenocarcinomas arose directly from normal crypts of Lieberkühn. The apparent nonexistence of small foci of intramucosal carcinoma, with or without microinvasion, in normal mucosa, and their frequency in adenomas, are two fundamental pathologic facts. They seem to disprove the proposition that cancer cells ordinarily arise *de novo* from the normal cells of the crypt of Lieberkühn without the interposition of a stage in the neoplastic process that is recognized as adenoma.

7859 PROCTOSIGMOIDOSCOPY AND POLYPECTOMY IN REDUCING THE INCIDENCE OF RECTAL CANCER. *(E.)* Gilbertsen, V. A. (Univ. Minnesota Med. Ctr., Minneapolis). *Cancer* 34(3)suppl.:936-939, 1974.

Results of a 25 yr study involving periodic proctosigmoidoscopy on 18,158 patients are presented. Apparently benign polyps or adenomas were removed when detected. Although 75-80 cancers would be expected to develop in this group of patients over this period, only 11 were observed. Each was detected while still localized within the bowel wall. Six of the 11 were mucosal without invasion, and in all but 1 there was no apparent involvement of the cancer deeper than the submucosa. Each was resected and no recurrences have been observed on follow-up. One patient died postoperatively at another hospital after segmental resection for a low sigmoid cancer. Another died 4 yr after surgery of a second cancer, primary in the common bile duct, without evidence that bowel cancer had recurred. Except for 1 patient, who has been followed for 3 yr, the remaining patients are 5-yr survivors and are apparently free of cancer. It is suggested that periodic proctosigmoidoscopy of high-risk patients could nearly eliminate lower bowel cancer as a cause of death at a cost which would be approximately the same as that presently required to treat patients with the disease.

7860 ASPECTS OF THE EPIDEMIOLOGY OF DIVERTICULAR DISEASE AND ISCHEMIC HEART DISEASE. *(E.)* Trowell, H.; Painter, N.; Burkitt, D. (Med. Sch., Makarere Univ., Uganda). *Am. J. Dig. Dis.* 19(9): 864-873, 1974.

Diverticular disease of the colon is common in populations where the intake of cereal fiber in the diet has been reduced dramatically for several decades. It has been shown that the addition of fiber in the form of wheat bran relieves the symptoms of the uncomplicated forms of the disease. It has been suggested that a deficiency of dietary fiber may play an etiologic role in ischemic heart disease. Data from the literature as well as from questionnaires sent to 170 hospitals in Africa, India and Pakistan have been used to study the geographic distribution of and association between diverticular disease and ischemic heart disease. Although the incidence of these diseases is not known accurately in many countries, it is evident from available data that the 2 are associated both clinically and geographically, often appearing together in the same patient. In more primitive societies, such as Africa, where fiber content of the diet remains high, the incidence of these 2 diseases has remained low; the incidence of diverticular and ischemic heart disease in the higher socioeconomic groups in these countries, who have begun to consume a low fiber content diet, has, however, begun to increase. It is suggested that fiber deficiency may help to cause not only diverticulosis, but also ischemic heart disease.

7861 POSTOPERATIVE COMBINED UNDERMINING INFECTION OF ABDOMINAL WOUND DUE TO Yersinia enterocolitica. *(E.)* Greenstein, A. J.; Dreiling, D. A. (Mt. Sinai Sch. Med., New York, N. Y.). *Mt. Sinai J. Med.* 41(5):665-666, 1974.

7862 PSEUDOMEMBRANOUS COLITIS ASSOCIATED WITH ANTIBIOTIC THERAPY—AN EMERGING ENTITY. *(E.)* Fenton, S.; Stephenson, D.; Weder, C. (Dept. Med., Univ. Saskatchewan, Saskatoon, Canada). *Can. Med. Assoc. J.* 111:1110-1111, 1114, 1974.

7863 OBSERVATIONS ON PAIN IN THE IRRITABLE COLON SYNDROME. *(E.)* Ritchie, J. A. (no affil.). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 201-210.

7864 LINCOMYCIN- AND CLINDAMYCIN-ASSOCIATED COLITIS. *(E.)* DeFord, J. W.; Molinaro, J. R.; Daly, J. J. (Wilford Hall Med. Ctr., Lackland AFB, Tex.). *Gastrointest. Endosc.* 21(1):19-21, 1974.

7865 NECROTIZING COLITIS. *(E.)* Heikkinen, E.; Larmi, T. K. I.; Huttunen, R. (Oulu Univ. Centr. Hosp., Finland). *Am. J. Surg.* 128(3):362-367, 1974.

7866 SELECTIVE ANGIOGRAPHIC STUDY IN A PATIENT WITH RECURRENT MELENA. *(E.)* Anonymous. *N. Engl. J. Med.* 291(11):569-575, 1974.

7867 THE BARIUM ENEMA AS TREATMENT FOR MASSIVE DIVERTICULAR BLEEDING. *(E.)* Adams, J. T. (Univ. Rochester Sch. Med., N.Y.). *Dis. Colon Rectum* 17(4):439-441, 1974.

7868 ANGIOGRAPHIC DIAGNOSIS AND CONTROL OF LARGE-BOWEL BLEEDING. *(E.)* Baum, S.; Athanasoulis, C. A.; Waltman, A. C. (Massachusetts Gen. Hosp., Boston). *Dis. Colon Rectum* 17(4):447-453, 1974.

7869 LEFT UPPER QUADRANT APPENDICITIS. *(E.)* Smith, D. E.; Jacquet, J. M.; Virgilio, R. W. (Naval Reg. Med. Ctr., San Diego, Calif.). *Arch. Surg.* 109(3):443-447, 1974.

7870 SARCOIDOSIS OF THE APPENDIX PRESENTING AS APPENDICEAL PERFORATION AND ABSCESS. *(E.)* Munt, P. W. (Med. Sch., Univ. North Carolina, Chapel Hill). *Chest* 66(3):295-297, 1974.

7871 TOTAL RECTAL PROLAPSE AND TOTAL GENITAL PROLAPSE: A SERIES OF 17 CASES. *(E.)* Azpuru, C. E. (no affil.). *Dis. Colon Rectum* 17(4):528-531, 1974.

7872 FAMILIAL IMPERFORATE ANUS: REPORT OF A FAMILY. *(E.)* Soussou, I.; Der Kaloustian, V.; Slim, M. (American Univ. Beirut Sch. Med., Lebanon). *Dis. Colon Rectum* 17(4):536-538, 1974.

7873 MUCOCELE OF THE DISTAL COLONIC SEGMENT, A LATE SEQUELA OF TRAUMA TO THE PERINEUM: REPORT OF A CASE. *(E.)* Nicosia, J. F.; Abcarian, H. (Cook County Hosp., Chicago, Ill.). *Dis. Colon Rectum* 17(4):536-538, 1974.

7874 MOTOR FUNCTION OF THE LARGE BOWEL IN MEGACOLON CONGENITUM. *(E.)* Lynen, F. K. (no affil.). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 189-195.

7875 MYOELECTRICAL ACTIVITY IN THE RECTOSIGMOID IN MAN. *(E.)* Taylor, I.; Smallwood, R.; Duthie, H. L. (Roy. Infirm., Sheffield, England). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 109-119.

7876 QUANTITATIVE STUDY OF THE CELL DENSITY OF THE LAMINA PROPRIA IN THE HUMAN RECTUM. *(E.)* Pallone, F.; Ricci, G. L.; Iannoni, C. (Med. Clin. II, Univ. Rome, Italy). *Rend. Gastroenterol.* 5(3):223-224, 1973.

7877 AN EPIDEMIOLOGIC APPROACH TO CANCER OF THE LARGE INTESTINE: THE SIGNIFICANCE OF DISEASE RELATIONSHIPS. *(E.)* Burkitt, D. P. (Med. Res. Council, London, England). *Dis. Colon Rectum* 17(4): 456-461, 1974.

7878 METABOLIC EPIDEMIOLOGY OF COLORECTAL CANCER. *(E.)* Wynder, E. L.; Reddy, B. S. (Naylor Dana Inst. Dis. Prevention, New York, N.Y.). *Cancer* 34(3):801-805, 1974.

7879 STAGE CLASSIFICATION AND END RESULTS REPORTING FOR CARCINOMA OF THE COLON AND RECTUM. *(E.)* Anderson, W. A. D. (Univ. Miami Sch. Med., Fla.). *Cancer* 34(3):909-911, 1974.

7880 COLORECTAL CARCINOGENESIS. *(E.)* Burdette, W. J. (Univ. Texas Med. Sch., Houston). *Cancer* 34(3): 872-877, 1974.

7881 HEREDITARY BENIGN AND MALIGNANT LESIONS OF THE LARGE BOWEL. *(E.)* Wennstrom, J.; Pierce, E. R.; McKusick, V. A. (Johns Hopkins Univ. Sch. Med., Baltimore, Md.). *Cancer* 34(3):850-857, 1974.

7882 "EARLY" LARGE BOWEL CANCER. A MORPHOLOGIST'S DILEMMA. *(E.)* McDivitt, R. W. (Univ. Utah Med. Ctr., Salt Lake City). *Cancer* 34(3): 904-908, 1974.

7883 EVOLUTION OF CANCER OF THE COLON AND RECTUM. *(E.)* Morson, B. C. (St. Mark's Hosp., London, England). *Cancer* 34(3):845-849, 1974.

7884 PREOPERATIVE RADIATION THERAPY. A PLAN FOR COMBINED THERAPY BY THE RADIATION THERAPY ONCOLOGY GROUP AND THE CENTRAL ONCOLOGY GROUP. *(E.)* Brady, L. W.; Antoniades, J.; Prasasvinichai, S.; Torpie, R. J.; Asbell, S. O.; Glassburn, J. R. (Hahnemann Med. Coll., Philadelphia, Pa.). *Cancer* 34(3):960-964, 1974.

7885 BACTERIA AND THE ETIOLOGY OF COLONIC CANCER. *(E.)* Hill, M. J. (Bacterial Metab. Res. Lab., C.P.H.L., London, England). *Cancer* 34(3):815-818, 1974.

7886 MEMBRANE ANTIGENS OF THE COLONIC TUMORS. *(E.)* Burtin, P. (Cancer Res. Inst., Villejuif, France). *Cancer* 34(3):829-834, 1974.

7887 EARLIER DIAGNOSIS OF CANCER OF THE COLON THROUGH COLONIC ENDOSCOPY (COLONOSCOPY). *(E.)* Wolff, W. I.; Shinya, H. (Beth Israel Med. Ctr., New York, N.Y.). *Cancer* 34(3)suppl.:912-931, 1974.

7888 CANCER OF THE COLON, RECTUM, AND ANUS: REVIEW OF 2313 CASES. *(E.)* Falterman, K. W.; Hill, C. B.; Markey, J. C.; Fox, J. W.; Cohn, Jr., I. (Louisiana State Univ. Sch. Med., New Orleans). *Cancer* 34(3):951-959, 1974.

7889 STATUS OF FULGURATION AND CRYOSURGERY IN THE MANAGEMENT OF COLONIC AND RECTAL CANCER AND POLYPS. *(E.)* Beahrs, O. H. (Mayo Clin., Rochester, Minn.). *Cancer* 34(3):965-968, 1974.

7890 COLITIS CYSTICA PROFUNDA, AN UNUSUAL SOLITARY TUMOR: REPORT OF THREE CASES. *(E.)* Farman, J.; Dallemand, S.; Robinson, T.; Keohane, M. F. (State Univ. New York-Downstate Med. Ctr., Brooklyn). *Dis. Colon Rectum* 17(4):565-569, 1974.

7891 POLYPOID GANGLIONEUROFIBROMATOSIS OF THE COLON. *(E.)* Brodey, P. A.; Hoover, H. C. (Dept. Diag. Radiol., NIH, Bethesda, Md.). *Br. J. Radiol.* 47(560):494-495, 1974.

7892 THE CHEMOTHERAPY OF COLORECTAL CANCER. *(E.)* Leone, L. A. (Rhode Island Hosp., Providence). *Cancer* 34(3):972-976, 1974.

7893 AREAS OF FAILURE FOUND AT REOPERATION (SECOND OR SYMPTOMATIC LOOK) FOLLOWING "CURATIVE SURGERY" FOR ADENOCARCINOMA OF THE RECTUM. CLINICOPATHOLOGIC CORRELATION AND IMPLICATIONS FOR ADJUVANT THERAPY. *(E.)* Gunderson, L. L.; Sosin, H. (Latter-Day Saints Hosp., Salt Lake City, Utah). *Cancer* 34(4):1278-1292, 1974.

7894 INTESTINAL POLYPOSIS SYNDROMES. *(E.)* Dodds, W. J.; Lydon, S. B. (Med. Coll. Wisconsin, Milwaukee). *CRC Crit. Rev. Clin. Radiol. Nucl. Med.* 5(3):295-336, 1974.

7895 POLYPECTOMY OF THE COLON BY ENDOSCOPY: FIRST RESULTS. *(E.)* Liguory, C.; Caletti, G. C.; Coffin, J. C.; Bognel, J. C.; Naudin, G. (St. Antoine Hosp., Paris, France). *Rend. Gastroenterol.* 5(3):224-225, 1973.

7896 SURGICAL MANAGEMENT OF COLORECTAL POLYPS. *(E.)* Leffall, Jr., L. S. D.; Chung, E. B. (Howard Univ. Coll. Med., Washington, D.C.). *Cancer* 34(3):940-947, 1974.

7897 JUVENILE POLYPS OF THE COLON AND RECTUM. *(E.)* Mazier, W. P.; Bowman, H. E.; Sun, K. M.; Muldoon, J. P. (Ferguson Clin., Grand Rapids, Mich.). *Dis. Colon Rectum* 17(4):523-527, 1974.

7898 RESULTS OF 100 CONSECUTIVE POLYPECTOMIES WITH THE FIBEROPTIC COLONOSCOPE. A NEW MODE OF TREATMENT. *(E.)* Nivatvongs, S.; Goldberg, S. M. (Univ. Minnesota Med. Sch., Minneapolis). *Am. J. Surg.* 128(3):347-350, 1974.

7899 LYMPHOID POLYPOSIS ASSOCIATED WITH FAMILIAL POLYPOSIS AND GARDNER'S SYNDROME. *(E.)* Shull, Jr., L. N.; Fitts, C. T. (Med. Univ. South Carolina, Charleston). *Ann. Surg.* 180(3):319-322, 1974.

7900 CONSERVATIVE THERAPY OF INTESTINAL OBSTRUCTION. *(Rus.)* Filatov, A. N.; Suslov, V. S. (Leningrad Res. Hematol. Blood Transfusion Inst., USSR). *Vestn. Khir.* 112(2):31-35, 1974.

7901 DIAGNOSIS AND TREATMENT OF INTESTINAL OBSTRUCTION. *(Rus.)* Rusanov, A. A. (Leningrad Pediatr. Med. Inst., USSR). *Vestn. Khir.* 112(2):36-41, 1974.

7902 URGENT PROBLEMS OF ACUTE INTESTINAL OBSTRUCTION. *(Rus.)* Serzhanin, A. I.; Aleksandriiskii, M. V.; Bobrova, N. B.; Serzhanina, O. A. (Voronezh Med. Inst., USSR). *Vestn. Khir.* 112(2):41-46, 1974.

7903 IDIOPATHIC MEGACOLON IN CHILDREN. *(Rus.)* Pugachev, A. G.; Leniushkin, A. I.; Klimanov, V. V. (Bashkir Med. Inst., Ufa, USSR). *Vestn. Khir.* 112(2):42-46, 1974.

7904 CONGENITAL MEGACOLON. *(Ger.)* Booss, D.; Schultze, F. (Centr. Hosp., Bremen, Germany). *Munch. Med. Wochenschr.* 116(22):1123-1128, 1974.

7905 VILLOUS ADENOMA OF THE RECTUM. *(Ger.)* Hauzeur, F.; Arendt, R. (Med. Clin., Univ. Rostock, Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 33(4/5):245-250, 1973.

7906 CYSTIC TUMORS OF THE APPENDIX. *(Sp.)* de Juan Burgueno, M.; Rivas Rodero, S.; Mir Pallardo, J. (La Fe Munic. Hosp., Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 44(1):23-34, 1974.

7907 MALIGNANT MELANOMA OF THE RECTUM. *(Sp.)* Vidal Sans, J.; Barreiro, F.; Moreno, J.; Noguera, A.; Tora, A.; Galofre Mora, P. (Navy Welfare Inst., Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 43(4):427-442, 1974.

7908 SOLITARY RECTAL ULCER. *(Fr.)* Vilotte, J.; Girodet, J.; Poupon, R.; Sonsino, E. (Bichat Hosp., Paris, France). *Sem. Hop. Paris* 50(28):1973-1979, 1974.

7909 RECURRENT CECAL INTUSSUSCEPTION. *(Rus.)* Laizan, P. A. (Livonian Reg. Hosp., Latvian SSR, USSR). *Vestn. Khir.* 112(3):129, 1974.

7910 DIVERTICULOSIS AND DIVERTICULITIS OF THE COLON. *(Pol.)* Goral, R.; Sniezynski, C. (Acad. Med., Poznan, Poland). *Pol. Przegl. Chir.* 45 (11):1341-1349, 1973.

7911 PNEUMATOSIS INTESTINALIS. *(Por.)* Pereira, A. S.; Magalhaes, A. F. N.; Queiroz, L. de S. (Med. Sci. Fac., State Univ. Campinas, Brazil). *Arq. Gastroenterol.* 11(3):167-172, 1974.

7912 PNEUMATOSIS INTESTINALIS. A CLINICAL-PATHOLOGICAL STUDY OF 11 CASES. *(Por.)* Pereira, A. S.; Queiroz, L. de S.; Magalhaes, A. F. N. (Med. Sci. Fac., State Univ. Campinas, Brazil). *Arq. Gastroenterol.* 11(3):157-165, 1974.

7913 STENOSIS OF THE LARGE INTESTINE AFTER IRRADIATION OF KIDNEY TUMORS. *(Ger.)* Rube, W.; Seegelken, K. (Knappschaft Hosp., Recklinghausen, Germany). *Strahlentherapie* 147(1):63-68, 1974.

See also, 7352, 7648, 7650, 7670, 7672, 7673, 7692, 7812, 7825, 7827, 7830, 8079, 8086, 8095, 8102, 8109, 8127, 8128.

LARGE INTESTINE

Ulcerative Colitis

7914 FLUORESCENT ANTI-COLON ANTIBODIES AND INFLAMMATORY EOSINOPHILIA IN ULCERATIVE COLITIS. *(E.)* Marcussen, H. (Gentofte Univ. Hosp., Hellerup, Denmark). *Scand. J. Gastroenterol.* 9(6):575-577, 1974.

The occurrence of colon-related circulating antibodies in 119 consecutive cases of ulcerative colitis (68 women and 51 men) was investigated with the indirect immunofluorescent method. Circulating antibodies were found in 19% of the patients (15 women and 8 men). Eosinophilia was detected in colonic mucosal exudate in 45% (36 women and 18 men) on semiquantitative cytological examination. The frequency of eosinophilia (78%) in patients with circulating anticolon antibodies was significantly greater than in the total patient group. This correlation may reflect a subepithelial cytological reaction: antigen-antibody complexes are thought to be formed subepithelially in the lamina propria where the cytologic reaction of inflammation appears, while eosinophilic granulocytes have an important role in experimental and clinical inflammations. During sigmoidoscopy, the macroscopic appearance of the rectal mucosa was classified as inactive, moderately active, or active. Inactive and active cases differed significantly with respect to the presence of eosinophilia but not with respect to anticolon antibodies.

7915 ENEMA VOLUME AS AN IMPORTANT FACTOR IN SUCCESSFUL TOPICAL CORTICOSTEROID TREATMENT OF COLITIS. *(E.)* Swarbrick, E. T.; Loose, H.; Lennard-Jones, J. E. (St. Mark's Hosp., London, England). *Proc. R. Soc. Med.* 67(8):753-754, 1974.

A group of patients with active ulcerative colitis being treated with corticosteroid retention enemas (solution tablets of prednisolone-21-phosphate dissolved in tap water) was studied. Five percent by volume of barium suspension was added to the solution. A plain abdominal film was then taken to mark how far the enema traveled. This distance was then compared with the known extent of disease in each individual. Use of 50 ml, 100 ml, and 200 ml of fluid showed that any given volume came into contact with an unpredictable area of colon. Generally, 50 ml remained in the rectosigmoid, but even with volumes of up to 200 ml the whole colon was rarely covered. In general, increasing the volume by 50 ml over a few days resulted in an increasing area of the colon being treated, but this was not consistently the case. In studies on 10 patients using 100 ml for several days, the proximal limit reached by the enema was the same on each day in 5 patients. In 3 patients there were small variations in the distance traveled, and in 2 patients the enema did not travel as far because the disease was healing and solid stool could be detected on the X-ray of the colon which had previously been empty. Thus, the degree of penetration between different patients was unpredictable, but it appeared fairly constant within individuals with active disease. For topical corticosteroid therapy to be effective the steroid solution and the inflamed mucosa must come into contact. When the disease is confined to the distal colon and rectum, an enema volume of 100 ml is usually adequate. When the colitis is more extensive, the enema containing the 5% barium suspension should be administered to the maximum volume easily retained by the patient and the distance thus penetrated be compared with the extent of disease in that individual. Only in this manner can adequate individualized treatment be established.

7916 IMMUNOLOGICAL STUDIES IN INFLAMMATORY BOWEL DISEASE. *(E.)* Teisberg, P.; Baklien, K. (Rikshops., Oslo, Norway). *Scand. J. Gastroenterol.* 9(27):43-44, 1974.

7917 A DOUBLE-BLIND COMPARISON OF THE EFFECTIVENESS OF AZATHIOPRINE AND SULPHASALAZINE IN IDIOPATHIC PROCTOCOLITIS. *(E.)* Caprilli, R.; Carratu, R.; Babbini, M. (Med. Clin. II, Univ. Rome, Italy). *Rend. Gastroenterol.* 5(3):224, 1973.

7918 METABOLIC ALKALOSIS IN "TOXIC MEGACOLON" COMPLICATING IDIOPATHIC PROCTOCOLITIS. *(E.)* Caprilli, R.; Alessandrini, A.; Minervini, S. (Med. Clin. II, Univ. Rome, Italy). *Rend. Gastroenterol.* 5(3):237-238, 1973.

See also, 8138.

PANCREAS

7919 COMPARISON OF STANDARD AND AUGMENTED SECRETIN TEST RESPONSES IN PATIENTS WITH AND WITHOUT PANCREATIC DISEASE: DELINEATION OF THE PANCREATIC TUBULAR CELL MASS AND ITS ALKALINE SECRETORY CAPACITY. *(E.)* Dreiling, D. A.; Greenstein, A. J.; Bordalo, O. (Mount Sinai Hosp., New York, N.Y.). *Am. J. Gastroenterol.* 61(6):433-442, 1974.

Secretory responses to standard secretin stimulation (1.0 U/kg iv.) and to augmented stimulation (4.0-5.0 U/kg iv.) were studied in 130 patients without pancreatic disease, 91 with chronic pancreatitis, 52 with pancreatic cancer, 83 with pancreatic hypersecretion, and in 9 patients following Duval resection (70-80%) of the pancreas. Gastric and duodenal secretions were collected for 80 min during both the standard and augmented tests. In subjects without pancreatic disease, quadrupling the secretin stimulus resulted in a 100% increase in the rate of flow and the rate of bicarbonate secretion, a 5% increase in mean bicarbonate concentration, and a 30% increase in amylase secretion. In patients with chronic pancreatitis, pancreatic cancer, and pancreatic hypersecretion, rates of secretory flow and bicarbonate secretion increased 40, 15, and 85% resp., following augmented secretin stimulation. Bicarbonate concentration remained fixed or decreased in patients with chronic pancreatitis but increased 10% in those with pancreatic cancer and pancreatic hypersecretion. Patients with pancreatic hypersecretion showed a 50% increase in amylase secretion response to augmented stimulation, whereas those with pancreatic cancer and chronic pancreatitis showed the same increase seen in the normal series. In 8 pancreatic resection patients, secretin response data were similar after standard and augmented stimulation, confirming the hypothesis of fixation of secretion and demonstrating the capacity of the pancreas to regenerate ductular and acinar tissue capable of delivering significant quantities of bicarbonate and enzyme to the duodenum. The results of sequential testing with standard and augmented stimuli suggest that a standard secretin test is sufficient for normal subjects. If low flow or low bicarbonate is encountered, the standard test should be immediately followed by an augmented test.

7920 ROLE OF SPLENIC ARTERIOGRAPHY IN EVALUATION OF MALIGNANT TUMORS IN THE BODY OF THE PANCREAS.

(E.) Suzuki, T.; Kitagawa, S.; Honjo, I. (Kyoto Univ. Med. Sch., Japan). *Surg. Gynecol. Obstet.* 139(4):509-513, 1974.

Selective arteriography, performed in 29 patients with carcinoma of the body of the pancreas which extended to the surrounding tissues beyond the border of the gland, was divided into 4 types according to the degree and pattern of tumor infiltration to the splenic artery: normal appearing, smooth tapering, rough tapering, and obstructing types. These divisions accounted for 3, 7, 13, and 6 patients, resp. The former 2 types were present in cases of cystadenocarcinoma (2), acinar cell carcinoma (1), nonfunctioning islet cell carcinoma (1), sarcoma (1), and carcinoid (1), as well as ductal cell carcinoma (4). All 19 of those with the latter 2 types had ductal cell carcinoma. Patients in the former group had metastases of the liver, those in the latter group had peritoneal dissemination. The longest average survival period (10.9 months) and highest percentage of resectability (100%) were in those patients with the normal appearing type, in whom the splenic artery showed no invasive signs by the tumor. The poorest prognosis, average 2.4 months survival time and 0% resectability, was in those patients with the obstructing type with the splenic artery completely interrupted by the lesion. In those with the smooth tapering and rough tapering types the prognosis was also poor, but removal of the main tumor in those with the smooth tapering type prolonged survival time. Hyperglycemia and severe lumber pain were frequent in those with the obstructing type. However, no significant differences in serum amylase, abdominal pain, or weight loss among each type was noted. Arteriography can help in the evaluation of malignant tumors of the body of the pancreas, a task for which only a few tools have yet been established.

7921 EXPERIENCE WITH ENDOSCOPIC RETROGRADE PANCREATICOGRAPHY.

(E.) Anacker, H.; Weiss, H. D.; Kramann, B.; Rupp, N. (Inst. Roentgenol. Diag., Tech. Univ., Munich, Germany). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 122(2):375-384, 1974.

Endoscopic retrograde pancreaticography was used for 650 examinations. Based on these observations an anatomical nomenclature of the pancreatic duct system was proposed. In the course of the normal evacuation of the pancreatic duct, 3 different phases were distinguished: contraction phase; evacuation phase; and resting phase. The average time for evacuation of the whole pancreatic duct system, after removal of the catheter from the papilla of Vater, took between 2 and 7 min. In papillary stenosis and in papillary spasm these phases were changed pathologically and the total evacuation time was prolonged. Malformation of the pancreas could only be visualized on retrograde pancreaticography if they communicated with the duct system. In chronic pancreatitis there were irregularities of the outline of the course of the duct with progress of the disease caused by ectasis, solitary or multiple stenoses, and deformities of the side ducts. Stones in the pancreatic main duct appeared as defects in the contrast medium filling. The special value of endoscopic retrograde pancreaticography lies in the diagnostic proof of pancreatic abscesses and pseudocysts shown by contrast medium extraductation. In cases of an abscess, there was a circumscribed contrast medium extraductation, usually 1-2 cm in size, sometimes with irregular contrast medium filling defects due to necrotic material or sequestra in the necrotic cavity. The diagnosis of abscess, as a space-occupying lesion, was confirmed by displacement of a larger duct. In pseudocyst there was a diffuse extraductation of contrast medium out of an autodigested or perforated duct, corresponding to the pathologic anatomic finding. The duct changes seen in pancreatic carcinoma were often similar to those of chronic pancreatitis. The normal appearance of the pancreatic main duct and side ducts between the tumor and papilla, and evaluation of all clinical and radiologic findings frequently allow the correct differential diagnosis.

7922 CARCINOMA OF THE PANCREAS. A PROGRAM FOR INCREASING SURVIVAL.

(E.) Humphrey, L. J.; Hartman, G. V. (Kansas Univ. Med. Ctr., Kansas City). *J. Kans. Med. Soc.* 75(9):281-282, 1974.

Immunotherapy combined with radiation therapy was used to treat 17 patients with incurable carcinoma of the pancreas without jaundice, ascites, or inanition. Most patients presented with jaundice which was relieved by a bypass procedure. Six patients received 4500-5000 rads to the pancreas over 4 1/2 to 5 weeks, followed immediately by 8 weeks of immunotherapy utilizing Vaccine I, prepared by mincing cancer tissue removed at surgery or autopsy, homogenizing the material, and freezing and thawing three times. At the conclusion of vaccine injections, these 6 patients underwent an exchange of white blood cells. The other 11 patients received 3000 rads during weeks 1, 2 and 3; Vaccine II during weeks 4, 5, 6 and 7; 2000 rads during weeks 8 and 9; and Vaccine II for weeks 10, 11, 12 and 13. No white blood cell exchange was performed on these 11 patients. To prepare Vaccine II, Vaccine I was centrifuged at 102,000 X g for 75 min. The supernatant was concentrated and frozen until ready for use. Both vaccines were administered intradermally and s.c. in either anterior thigh as 1 ml injections/week for a total of 8 injections. No untoward effects were noted. Of the first 6 patients, 2 died within 1 month of white blood cell exchange. The others survived an average of 18 months. In 2 of these a palpable pancreatic mass disappeared after completion of the combined therapy. Of the 11 patients receiving Vaccine II, 1 died 2 months after treatment of a pulmonary embolus; 6 died 2 to 5 months after treatment; the other 4 are alive at 5, 9, 9, and 10 months after therapy. As the known average survival time following bypass palliative treatment for carcinoma of the pancreas is 6.6 months, data from this study shows some improvement. A program for treatment of patients with carcinoma of the pancreas has been devised which includes: either resection or bypass procedure; 4000 to 5000 rads to the pancreas; immunotherapy consisting of Vaccine II injections for 4 to 8 weeks concluded by white blood cell exchange; and 500 mg 5-fluorouracil, p.o., beginning with radiation therapy and continuing weekly for an indefinite period.

7923 ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY IN THE DIAGNOSIS OF PANCREATIC CANCER. EXPERIENCE WITH 54 CASES. *(E.)* Stadelmann, O.; Safrany, L.; Loffler, A.; Barna, L.; Miederer, S. E.; Papp, J.; Kaufer, C.; Sobbe, A. (Surg. Clin., Univ. Bonn, Germany). *Endoscopy* 6(2):84-93, 1974.

7924 CARCINOMA OF THE PANCREAS—EARLY DIAGNOSTIC PRESUMPTIVE SIGNS. *(E.)* Smith, E. B. (no affil.). *J. Natl. Med. Assoc.* 66(6):496-498, 1974.

See also, 7645, 7657, 7658, 7667, 7668, 7674, 7675, 7676, 7686, 7758, 7845, 8034.

PANCREAS

Pancreatitis

7925 LATENT ONSET OF CLINICAL PANCREATITIS IN CHILDREN RECEIVING L-ASPARAGINASE THERAPY. *(E.)* Weetman, R. M.; Baehner, R. L. (Indiana Univ. Sch. Med., Indianapolis). *Cancer* 34(3):780-785, 1974.

The pancreatic toxicity of L-asparaginase was studied in 43 children (26 boys and 17 girls) (48 trials of therapy) with either acute lymphocytic leukemia or acute undifferentiated leukemia. Some of the patients had advanced disease refractory to conventional oncotoxic therapy and others were being induced initially with vincristine, prednisone, and L-asparaginase in combination. The L-asparaginase dosage ranged from 3000 to 6000 IU/m^2 i.m. 3 times/week in patients manifesting L-asparaginase pancreatic toxicity (specific activity range, 225 to 275 IU/mg protein). Of the 43 children, 5 developed transient hyperglycemia or diabetes mellitus (11.6%), all of whom were also on steroid therapy which could have potentiated the diabetes. Pancreatitis secondary to L-asparaginase therapy has been reported to occur during administration of the drug. However, 4 of the 7 patients who developed pancreatitis secondary to L-asparaginase developed their disease 4 days to 10 weeks after therapy ceased. Of these 7 who developed pancreatitis, 5 were girls older than 9 yr of age, when serum estrogen and other female sex hormones begin to rise. Endogenous estrogens may prolong the half-life of the drug or enhance enzyme activity in young adolescent females, making them more susceptible to L-asparaginase toxicity. Serum amylase values were elevated in all patients who developed pancreatitis and urine amylase values were elevated in 4. It is suggested that L-asparaginase should be discontinued if an elevated serum or urine amylase value is found.

7926 X-RAY FINDINGS OF PANCREATIC CYSTS DIAGNOSED BY ENDOSCOPIC PANCREATOCHOLANGIOGRAPHY. *(E.)* Seifert, E.; St. Stender, H.; Safrany, L.; Lesch, P.; Luska, G.; Misaki, F. (Med. Sch., Hanover, Germany). *Endoscopy* 6(2):77-83, 1974.

During a 3-yr period, a total of 32 pancreatic cysts were diagnosed by endoscopic pancreatocholangiography with a fiberoptic duodenoscope, and the diagnosis was confirmed by subsequent surgery. Based on x-ray findings, signs characteristic or suspicious of pancreatic cysts are: 1) direct filling of the cyst cavity, 2) a filling defect in the pancreatic branches and parenchyma, 3) obstruction of the main pancreatic duct, either abrupt or tapering, 4) displacement and/or compression of the common bile duct. Cysts were found in the head of the pancreas in 17 cases and in the tail in 15 cases. Single cysts were more common than multiple ones. The finding of a pancreatic cyst, or of signs suspicious of a cyst, is an indication for surgery. Filled cysts without discharge into the main duct must be operated upon within 10 hr of endoscopy because of the greatly increased risk of infection resulting from the procedure.

7927 ENDOSCOPIC PANCREATOGRAPHY IN THE EVALUATION OF PATIENTS WITH SUSPECTED PANCREATIC PSEUDOCYSTS. *(E.)* Silvis, S. E.; Vennes, J. A.; Rohrmann, C. A. (Univ. Minnesota Med. Sch., Minneapolis). *Am. J. Gastroenterol.* 61(6):452-459, 1974.

Pancreatographic findings are presented for 16 patients with surgically proven pancreatic pseudocysts and 13 patients with suspected pancreatic pseudocysts. All patients with proven pseudocysts had abnormal studies. In 12 of the 16 the cyst was filled with contrast and in 2 additional patients the diagnosis of pseudocyst was suggested by deviation of the pancreatic and/or bile duct. In 1 patient with a mass deforming the upper gastrointestinal series, a pseudocyst was suggested by obstruction of the main duct. Of the 13 patients with suspected pancreatic pseudocysts, 9 had normal pancreatograms. Surgery on 3 patients revealed 2 true cysts, neither of which filled with contrast material, and 1 carcinoma of the pancreas. The remaining patient was thought to have pancreatic edema which resolved. Serial pancreatograms obtained in 2 patients who were followed without operation showed spontaneous regression of pseudocysts over a period of 1 1/2 yr and 2 1/2 months, resp. This study demonstrates that pseudocysts frequently communicate with the major pancreatic ducts and may spontaneously resolve. Endoscopic pancreatography appears to be of value in the exclusion of suspected cases as well as in the diagnosis and treatment of pseudocysts.

7928 SECONDARY GASTRIC MURAL ABNORMALITIES SIMULATING PRIMARY DISEASE IN ISOLATED CHRONIC LEFT SUBPHRENIC ABSCESS AND ISOLATED CHRONIC PANCREATITIS. *(E.)* Feinberg, S. B.; Tully, T. E. (Univ. Minnesota Hosp., Minneapolis). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 122(2):413-418, 1974.

Gastrointestinal studies performed on 10 cases of isolated chronic left subphrenic abscesses and roentgen examinations performed on 48 cases of isolated left upper quadrant chronic pancreatitis were reviewed for evidence of mural changes of the stomach. Gastrointestinal studies were strongly positive in 5 of the subphrenic abscess cases, were minimally to moderately positive in 4, and were normal in 1. The roentgen examinations in chronic pancreatitis cases included routine gastrointestinal contrast medium examinations (36 patients) and plain film abdominal roentgenography (12 patients), none of which showed unequivocal gastric wall thickening. Of 52 contrast medium studies performed on the 36 patients, 37 were positive and showed: striking mural thickening in the form of nodular or serpentine folds of the entire upper one-third to one half of the stomach (10); local hypertrophy of the portion of stomach in contact with the pancreatic bed or lateral left upper quadrant including the gutter (12); simple nonspecific rugal hypertrophy (1); and positive classical changes of pancreatitis such as widening and defacement of the duodenal loop, spasm of duodenitis, pseudocyst gastric displacement, pancreatic necrosis, and pancreatic calculi without gastric wall abnormalities (14). In the 5 severe subphrenic abscess cases, findings were more localized to cardia and fundus, the mucosa was not disrupted or ulcerated, the rugae were more nodular and the wall was more likely locally thickened in a circumferential fashion. The pars media was less involved and extended primarily no further than the upper third thereof. In the 10 severe pancreatitis cases gastric involvement was more extensive, but more prominent along the lesser curvature, posterior wall, and greater curvature aspect of the stomach even though the folds were less thickened and less abnormal in the cardia and fundus than in the pars media. The fold and mural patterns were less nodular and more longitudinally serpentine than in the isolated abscess cases. Based on these 15 pancreatitis and subphrenic abscess cases, differentiation between extensive chronic pancreatitis or subphrenic abscess induced gastric induration is possible and the site of origin of the extragastric inflammation is probably determinable.

7929 METHEMALBUMIN IN THE DIAGNOSIS OF ACUTE HEMORRHAGIC PANCREATITIS. *(E.)* Geokas, M. C.; Rinderknecht, H.; Walberg, C. B.; Weissman, R. (Sepulveda VA Hosp., Los Angeles, Calif.). *Ann. Intern. Med.* 81(4):483-486, 1974.

Serum, ascites fluid and pleural effusion levels of methemalbumin were studied in patients with acute edematous or hemorrhagic pancreatitis, and in patients with unrelated disease. The serum methemalbumin level ranged from 0.9-8.8 mg/100 ml in 17 alcoholic patients with acute hemorrhagic pancreatitis, and 1 with pancreatitis and acute cholecystitis. Ascites fluid in these patients (14 men and 4 women, aged 27-86 yr) contained 2.6-54 mg/100 ml methemalbumin. The level of methemalbumin in pleural effusions from 7 of the 18 ranged from 2-12 mg/100 ml. In 20 patients (10 women and 10 men, aged 21-64 yr) with acute edematous pancreatitis (including 10 alcoholics, 9 with gallstone pancreatitis, and 1 with acute pancreatitis of pregnancy), no methemalbumin was found in serum or ascites fluids tested throughout hospitalization. Daily test results revealed no methemalbumin in serum from 5 patients (aged 26-58 yr) with gastrointestinal bleeding and 2 patients (aged 48 and 54 yr) with intraabdominal hemorrhage. Early differentiation between acute edematous and hemorrhagic pancreatitis is essential for treatment and good prognosis. By testing serum and ascites fluid or pleural effusions for methemalbumin, the 2 types of pancreatitis can be distinguished early in the course of the disease. The detection of methemalbumin in serum and enzyme studies compatible with acute pancreatic inflammation should be considered virtually pathognomonic of the hemorrhagic form.

7930 MALABSORPTION OF VITAMIN B_{12} IN CHRONIC PANCREATITIS. *(E.)* Matuchansky, C.; Lenormand, Y.; Bernier, J. J. (St. Lazare Hosp., Paris, France). *Digestion* 10(3):232, 1974.

7931 PANCREATITIS AND THE LUNGS. *(E.)* McWilliams, H.; Gross, R. (Paoli Mem. Hosp., Paoli, Pa.). *Am. Surg.* 40(8):448-452, 1974.

7932 ETIOLOGY OF CHRONIC PANCREATITIS IN BOHEMIA. *(Cz.)* Herfort, K.; Bartos, V.; Kotrlik, J. (Fac. Gen. Med., Charles Univ., Prague, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 28(1):18-23, 1974.

7933 CLINICAL ASPECTS AND DIAGNOSIS OF PANCREATITIS IN CHILDREN. *(Rus.)* Zernov, N. G.; Sakharova, N. F.; Topp, V. S.; Samorukova, T. A. (Moscow Inst. Med. Stomatol., USSR). *Pediatriia* (7):7-11, 1973.

7934 PREHOSPITAL TREATMENT OF ACUTE PANCREATITIS. *(Rus.)* Avsanov, Kh. B. (Sever-Osetinsk Med. Inst., USSR). *Vestn. Khir.* 111(12):20-23, 1973.

7935 SOME ASPECTS OF SURGICAL TREATMENT OF ACUTE PANCREATITIS. *(Rus.)* Avdei, L. B.; Artishevskii, L. I.; Madorskii, I. L.; Dorozkho, N. I. (Minsk Med. Inst., USSR). *Vestn. Khir.* 112(2):46-50, 1974.

7936 INCIDENCE OF PATHOLOGICAL LESIONS IN THE SURGICAL TECHNIQUE FOR ACUTE PANCREATITIS. *(Fr.)* Poilleux, F.; Alexandre, J. H. (Broussais Hosp., Paris, France). *Bull. Acad. Natl. Med. (Paris)* 157(9):754-785, 1973.

See also, 7657, 7668, 7676, 7677, 7768, 7919, 7921.

LIVER AND BILIARY TRACT

7937 LIVER HAMARTOMAS IN PATIENTS ON ORAL CONTRACEPTIVES. *(E.)* O'Sullivan, J. P.; Wilding, R. P. (St. George's Hosp., London, England). *Br. Med. J.* 3(5922):7-10, 1974.

Benign liver cell tumors occurred in 3 women who had been taking oral contraceptives (lynoestrenol-mestranol, ethynodiol-mestranol, and norethindrone-mestranol) for at least 4 yr. One patient presented with vague gastrointestinal symptoms, 1 with a symptomless abdominal lump, and in 1 the liver mass was found incidentally at cholecystectomy. Celiac angiography performed in 2 patients showed an abnormal vasculature. In these 2 patients the lesion was at the tip of the right lobe and local removal was performed. In the 3rd patient the nodule was in the medial part of the left lobe and only frozen-section biopsy was performed. In all cases dilated endothelium-lined vascular channels were present and the remainder of the liver was normal. The lesions in these patients are best described as hamartomatous nodules rather than benign liver cell adenomas. This diagnosis must be considered in any patient with clinical features of bleeding into the peritoneal cavity, particularly if a mass is palpable in the upper abdomen. Both liver scan and celiac arteriography are helpful in diagnosis; needle biopsy is contraindicated due to the risk of hemorrhage. In view of the high death rate from hemorrhage in previously reported cases, these hamartomas should be removed. In elective cases, the choice is between local removal and a formal lobectomy. Treatment in emergency cases is aimed at controlling blood loss with liver resection. Practioners should exclude the presence of an epigrastic mass in a patient before prescribing oral contraceptives and should consider hepatic hamartoma as a possible cause of hemoperitoneum in women on the pill.

7938 PRIMARY NON-DIFFERENTIATED SARCOMA OF THE LIVER. CASE REPORT AND REVIEW OF THE LITERATURE. *(E.)* Mattila, S.; Keskitalo, E.; Makinen, J. (Dept. Thoracic Surg., Univ. Helsinki, Finland). *Acta Chir. Scand.* 140(4):303-307, 1974.

A case of primary nondifferentiated sarcoma of the liver occurred in a 68-yr-old woman. Serum bilirubin was 6.0 mg/100 ml, and alkaline phosphatase, 89 U/liter. Symptoms included pain, caused by a right upper quadrant mass, which radiated to the right shoulder. Acute rupture and bleeding of the tumor led to emergency operation for suspected acute peritonitis. The tumor was found to have replaced the whole right lobe of the liver and infiltrated the medial segment of the left lobe. No evidence of metastasis was found at operation. To stop the bleeding it was necessary to resect the whole right hepatic lobe and the medial segment of the left lobe. After operation hypokalemia, acidosis, hyperglycemia, and atrial fibrillation occurred, all of which were successfully treated. The patient recovered uneventfully from surgery and showed good regenerative capacity of the liver. However, death occurred 5 months later due to metastases of the tumor. At autopsy, the liver was free from tumor growth, but there were metastases in the abdominal and pleural cavities. The tumor was histologically classified as a malignant mesenchymal sarcoma composed mainly of spindle cells. There were arrangements of the cells into cords and whorls and larger cells with abundant cytoplasm. The lack of detectable cross-striation prevented a closer classification of the tumor. Resection of the tumor combined with preoperative radiotherapy is the treatment of choice in such cases.

7939 PRIMARY LIVER CANCER, ALPHA$_1$ FETOPROTEIN AND HEPATITIS B ANTIGEN IN PAPUA NEW GUINEA. *(E.)* Woodfield, D. G.; Endo, Y.; Matsuhashi, T. (Red Cross Blood Transfusion Service, Boroko, Papua New Guinea). *Aust. NZ J. Med.* 4(1):3-7, 1974.

Conventional and radioimmunoassay techniques used for the detection of α_1-fetoprotein and hepatitis B antigen (HBAg) and antibody in sera from 72 Papua New Guinean patients with primary liver cell cancer are described. The male:female ratio of the study group was 4.5:1; mean age of males was 33.1 yr, of females, 34.2 yr. Of 51 patients with histologically diagnosed hepatic cell carcinomas, 48 (94%) had sera positive for α_1-fetoprotein detected by double immunodiffusion. Of the 3 samples negative for α_1-fetoprotein by this test, 2 were positive by radioimmunoassay and 1 was negative. Of 72 patients with histologically diagnosed tumors or α_1-fetoprotein positive sera, 19 (29%) were positive for HBAg by immunoelectroosmophoresis. Using immuno-adherence hemagglutination assay, 55 (76%) of these patients were positive for HBAg. Of the 17 negative HBAg samples, 4 were positive by radioimmunoassay. Of the 72 samples tested, two specimens (2.8%) contained HB antibody by the passive hemagglutination technique. Thus the double immunodiffusion technique was adequate for the detection of α_1-fetoprotein in most primary hepatic cancers in Papua New Guinea. The fact that the incidence of α_1-fetoprotein production in experimentally produced liver cell cancers in animals varies with the carcinogenic agent used suggests a single etiological factor may be involved in liver cancer in Papua New Guinea, possible naturally occurring hepatotoxins and fungal contaminants of food, mainly aflatoxins, known to be hepatocarcinogenic in animals. The reason for the high frequency of HBAg in liver cancer is not known. The possibility that disturbed immunity may be involved is strengthened by the finding of HB antibody in only 2.8% of the patients with liver cell carcinoma, which may indicate an immune reaction absorbing any antibody produced, and removing antigen from the sera.

7940 EXPERIMENTAL AND CLINICAL STUDIES ON THE INCREASE IN SERUM γ-GLUTAMYL TRANSPEPTIDASE ACTIVITY IN HEPATOBILIARY DISEASE. *(Ger.)*

Thiele, K. G.; Holmes, A. W.; Mattenheimer, H. (Med. Clin., Univ. Cologne, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79:925-927, 1973.

Serum and liver γ-glutamyltranspeptidase (GGTP) activities were determined in 8 marmosets 24 hr to 6 months after ligation and sectioning of the common bile duct and cholecystectomy under phencyclidine anesthesia. Controls consisted of 4 sham-operated animals and 4 anesthetized animals. Progressive increases occurred in GGTP activity in the livers of both operated and sham-operated controls. Although mean values were lower in sham-operated animals than in animals with ligated bile ducts 120 hr after surgery, the difference was not significant. Alkaline phosphatase activities in the liver followed a similar pattern, and no significant difference was found between operated and sham-operated animals. No appreciable change in glutamate-oxalate transaminase and glutamate dehydrogenase activities occurred in the liver, while mean glutamate-pyruvate activities decreased 59% after 120 hr. Serum GGTP activities increased 64-fold in operated animals and only 5-fold in sham-operated animals 120 hr after surgery. Both liver and serum GGTP activities had decreased significantly 5 weeks after surgery. Acute carbon tetrachloride (CCl_4) intoxication (1.25 ml/kg) caused a 114% increase in liver GGTP activity after 12 hr and a 267% increase after 36 hr. Septal fibrosis and localized steatosis, induced in 4 animals by repeated i.p. injection of CCl_4 over an 8-week period, was accompanied by a 4-fold increase in GGTP activity in the liver and a 2.8-fold increase in serum. Of 12 marmosets with infectious hepatitis, only 5 showed increases in serum GGTP activities. These values reached values 6 times the initial levels an average of 8 weeks after inoculation. Thus, in contrast to other findings in the literature, increases in GGTP and alkaline phosphatase in the liver are not specific for cholestasis. When GGTP activity was measured in serum and liver homogenates from 54 patients with various liver diseases, alcoholics with fatty liver had the highest GGTP activities in the liver while the highest serum activities were found in patients with extra- or intrahepatic cholestasis. The liver/serum concentration gradient was significantly smaller in these patients than in those with other liver diseases. Except for patients with cholestasis, a significant correlation was found between GGTP activities in the liver and serum. Therefore, it is possible that GGTP can pass directly from damaged liver cells into the blood. These findings indicate that 2 mechanisms are involved in the increase in GGTP activity which occurs in the serum in hepatobiliary disease: (1) an increase in enzyme synthesis in the liver during which the permeability of cell membranes remains the same or increases and (2) regurgitation of GGTP which cannot be excreted in the bile when bile flow is obstructed.

7941 HEPATIC ABSCESS: CHANGES IN CLINICAL, BACTERIOLOGIC AND THERAPEUTIC ASPECTS. *(E.)*

Rubin, R. H.; Swartz, M. N.; Malt, R. (Massachusetts Gen. Hosp., Boston). *Am. J. Med.* 57(4): 601-610, 1974.

Clinical, bacteriologic, and therapeutic aspects of 53 patients with hepatic abscesses seen from 1961 to 1973, are reviewed. Total mortality was 63%. Patients over 50 yr of age constituted the greatest number of cases (38) and mortality among them was 79%. Fifty abscesses were pyogenic and 3 amebic in etiology. Macroscopic abscesses were present in 35 cases and microscopic in 18. Macroscopic pyogenic abscesses were most commonly caused by biliary tract infection (11 cases), direct extension from contiguous sites of infection (8 cases), and nonpenetrating trauma usually the result of an auto-accident (5 cases). The micro abscesses were found to be caused by biliary tract infection (9 cases), systemic bacteremia (8 cases) and pylephlebitis (1 case). Hepatic scintiscan and abdominal angiography provided positive findings in all cases where the abscess exceeded 1 cm in diameter. Bacteria of bowel origin (especially *E. coli*) were the common etiologic agents. In children with bacteremia, *Staph. aureus* is predominantly implicated. Effective therapy relies in prolonged administration of antibiotics and aggressive surgical drainage.

7942 SOLITARY NEONATAL HEPATIC ABSCESS. *(E.)*

Kandall, S. R.; Johnson, A. B.; Gartner, L. M. (Albert Einstein Coll. Med., Bronx, N.Y.). *J. Pediatr.* 85(4):567-569, 1974.

A solitary hepatic abscess was found at postmortem examination in a female neonate who died at 25 days of age. The infant was delivered by cesarean section at 35 weeks of a normal gestation after signs of fetal distress developed during labor. The infant was severely depressed at birth and weighed 2500 g. An umbilical catheter was initially placed without rigid aseptic conditions. The mother had undergone amniocentesis several weeks previously. Chest x-ray at 4 hr of age showed elevation of the right hemidiaphragm which persisted throughout the hospital course. The baby was managed by ventilatory assistance, regulation of arterial blood gases, maintenance of blood pressure, systemic antibiotics, and hyperalimentation for the last 15 days of life. On day 25, the infant developed abdominal distension and bradycardia and had a cardiac arrest. Urine and blood cultures were consistently negative until the final day of life when a blood culture grew *Enterobacter liquifaciens*. Liver function tests were normal. Autopsy revealed 200 ml clear peritoneal fluid and elevation of the right hemidiaphragm with purulent material between the dome of the liver and the right diaphragm and an abscess cavity within the right lobe of the liver. Culture of the hepatic abscess showed many coliform bacteria. The findings suggested that the hepatic abscess was probably present at birth. Recognition of the association between hepatic abscess and congenital diaphragmatic elevation might have led to surgical intervention and increased the infant's chance of survival. A liver scan with technetium-sulfur colloid should be performed when neonatal liver abscess is suspected. Clarification between a vascular space-occupying mass and an abscess could then be made by dynamic nuclide angiography with sodium pertechnetate.

7943 LIVER ENZYMES AND PATHOLOGY IN HODGKIN'S DISEASE. *(E.)* Belliveau, R. E.; Wiernik, P. H.; Abt, A. B. (U.S. Public Hlth. Service Hosp., Baltimore, Md.). *Cancer* 34(2):300-305, 1974. 305, 1974.

Liver pathology and the levels of serum enzymes of presumed hepatic origin (alkaline phosphatase (AP), γ-glutamyl transpeptidase (γ-GT), SGOT, and 5'-nucleotidase (5'N)) were correlated in 67 patients with Hodgkin's disease to determine the degree to which the serum measurements reflect hepatic involvement in the disease. Forty-seven of the patients were untreated (8 Stage I, 18 Stage II, 14 Stage III, and 7 Stage IV), 20 having been previously treated (2 Stage I, 4 Stage II, 5 Stage III, and 9 Stage IV). Eleven patients had hepatic lesions diagnostic of Hodgkin's disease, 3 had epithelioid cell granulomata, and 31 had nonspecific abnormalities. Serum AP levels were elevated in patients with liver biopsies demonstrating Hodgkin's disease, granulomata, cholestasis, and hepatitis, a slightly higher mean value occurring in patients with hepatic Hodgkin's disease. Patients with advanced Hodgkin's disease tended to have higher serum AP levels than patients with localized disease whether or not Hodgkin's disease of the liver was demonstrated. Serum γ-GT levels were 2- to 3-fold higher in patients with granulomata, cholestasis, and hepatitis than in those with Hodgkin's disease. SGOT and serum 5'N levels were highest in patients with hepatitis and cholestasis. The data indicate that liver biopsy is the only definitive method for determining hepatic involvement in Hodgkin's disease.

7944 HEPATIC PATHOLOGY ASSOCIATED WITH HODGKIN'S DISEASE. *(E.)* Abt, A. B.; Kirschner, R. B.; Belliveau, R. E.; O'Connell, M. J.; Sklansky, B. D.; Greene, W. H.; Wiernik, P. H. (U.S. Public Hlth. Service Hosp., Baltimore, Md.). *Cancer* 33(6):1564-1571, 1974.

Liver biopsies obtained from 103 untreated and 25 previously treated patients during staging laparotomy for Hodgkin's disease were reviewed. Wedge biopsies from at least one hepatic lobe were obtained from 70 patients. The treated patients had received radiation and/or chemotherapy. No significant differences were noted between the two groups in terms of the incidence of Hodgkin's disease, epithelioid cell granulomata, or nonspecific inflammation. The treated patients showed a nonsignificant increase in fatty infiltration and hemosiderosis. Elevated serum alkaline phosphatase levels were associated with nonspecific lesions, Hodgkin's disease, and normal biopsies. There was no apparent relation between different nonspecific abnormalities in the same biopsy, or between the nonspecific lesions and hepatic Hodgkin's disease. Eleven patients had splenic granulomata, and 9 of 10 patients with epithelioid cell granulomata of the liver had similar splenic lesions. Hepatitis-associated antigen was found in 5 patients: 2 untreated patients with nonspecific portal inflammation, 1 untreated patient with Hodgkin's disease, 1 treated patient with chronic active hepatitis, and 1 treated patient with a focal fatty infiltration; 3 of these patients also demonstrated hemosiderosis. The needle biopsies revealed no lesions not demonstrated by the wedge biopsies. Careful examination of the liver surface during laparotomy is important.

7945 HEPATIC HEXOKINASE ISOZYME IN LIVER DISEASES. *(E.)* Ueda, M.; Taketa, K.; Shimamura, J.; Kosaka, K. (Okayama Univ. Med. Sch., Japan). *Clin. Chim. Acta* 53(3):381-383, 1974.

Activities of hexokinase isozymes were determined in liver supernatants prepared from needle-biopsy specimens from 4 patients with liver diseases (acute hepatitis, chronic hepatitis, postnecrotic cirrhosis, and hepatocellular carcinoma, resp.) and from 1 patient with no histological evidence of specific liver disease and with normal glucose tolerance. Hexokinase (glucokinase) activities were determined spectrophotometrically at 0.5 and 100 mM glucose concentrations. Enzyme extracts were applied stepwise in total amounts of 8 µl each/12 mm. After electrophoresis on a cellulose acetate gel membrane, enzyme activity was visualized with 0.5 and 100 mM glucose as substrate; and the strip developed with 0.5 mM glucose was analyzed by densitometry to estimate the relative intensities of low K_m hexokinase bands. The activities of hexokinases I, II, and III were calculated from the relative intensities of these bands and from total activity of the original extract. The results suggest that the pattern of hepatic hexokinase isozymes may differ significantly in various stages of liver disease. There was a marked increase in Type III hexokinase in acute hepatitis and a gradual increase in Type I hexokinase with progression of disease from chronic hepatitis to cirrhosis and possibly to primary hepatoma. Type II hexokinase was absent in normal liver, chronic hepatitis, and hepatocellular carcinoma. Examination of hepatic hexokinase isozymes by the present method may be of value in establishing differential diagnosis as well as in elucidating the pathophysiology of liver diseases.

7946 ABNORMAL LIVER SCANS IN PATIENTS WITH ALPHA$_1$-ANTITRYPSIN DEFICIENCY. *(E.)* Yun Ryo, U.; Moses, D. C.; Milam, W. F. (Univ. Michigan Med. Ctr., Ann Arbor). *J. Nucl. Biol. Med.* 18(2):39-43, 1974.

Abnormal liver-spleen scans were obtained in 2 men (47 and 52 yr old) with emphysema and heterozygous α_1-antitrypsin deficiency. The first patient also had hyperthyroidism and abnormal liver function tests (SGOT, SGPT, LDH alkaline phosphatase, and serum albumin) and presented with progressive shortness of breath and weight loss. His liver-spleen scan showed nonhomogeneous and decreased uptake into the liver with increased spleen uptake, splenomegaly and increased bone marrow uptake. Liver biopsy showed cirrhosis. Many hepatocytes contained periodic acid-Schiff-positive cytoplasmic inclusion bodies characteristic of those found in patients with α_1-antitrypsin deficiency. The second patient also presented with progressive shortness of breath. He had slight hepatomegaly but liver function tests were normal. Liver-spleen scan showed patchy uptake and hepatomegaly. No liver biopsy was obtained. These cases illustrate a possible role for liver scanning in screening and following α_1-antitrypsin deficiency of liver disease.

7947 AN ISOENZYME OF 5'-NUCLEOTIDE PHOSPHODIESTERASE AND α-FETOPROTEIN IN HUMAN HEPATIC CANCER PATIENT SERA. *(E.)* Tsou, K. C.; McCoy, M. G.; Lo, K. W. (Sch. Med., Univ. Pennsylvania, Philadelphia). *Cancer Res.* 34(10):2459-2463, 1974.

Sera from 43 patients with primary hepatoma and from 55 patients with other cancers metastatic to liver were studied for the presence of a 5'-nucleotide phosphodiesterase (5'-NPDase) isoenzyme (band V, quickly migrating on polyacrylamide gels) and α-fetoprotein. Results indicated that the serum 5'-NPDase assay is a more reliable and sensitive test for primary hepatoma and metastatic liver cancer than is the serum α-fetoprotein assay by immunodiffusion. The 5'-NPDase isoenzyme was detected in 38 of the 43 patients with primary hepatoma and in 44 of the 55 patients with metastatic liver disease. α-Fetoprotein, by contrast, was detected in only 6 of the hepatoma patients by immunodiffusion and in another 6 of the 18 initially negative sera by counterimmunoelectrophoresis. Blocking studies using immunodiffusion showed that isoenzyme positive, α-fetoprotein-negative sera did not contain any component that would block or interfere with the reaction of α-fetoprotein with anti-α-fetoprotein. 5'-NPDase and α-fetoprotein had different mobilities on polyacrylamide gel electrophoresis. Trypsinization caused formation of a 5'-NPDase isoenzyme in band V position in normal and cord sera and an increased intensity in hepatoma serum, while removing or decreasing intensity of bands II, III and IV for all sera. Trypsinization of cord serum resulted in degradation of α-fetoprotein.

7948 METHIONINE ADENOSYLTRANSFERASE DEFICIENCY: NEW ENZYMATIC DEFECT ASSOCIATED WITH HYPERMETHIONINEMIA. *(E.)* Gaull, G. E.; Tallan, H. H. (N.Y. State Inst. Basic Res. Mental Retardation, Staten Island). *Science* 186(4158):59-60, 1974.

A specific deficiency of methionine adenosyltransferase has been demonstrated in extracts of liver from an infant with hypermethioninemia. The newborn, who was identified through a mass screening survey, had a plasma methionine level of 128 μM/100 ml, over 30 times the normal value. There was no homocystinemia, hypocystinemia, or cystathioninuria. The child has remained apparently normal to the age of 1 yr although electron micrographs of liver tissue obtained by percutaneous biopsy have shown breaks in the outer membranes of the mitochondria and hyperplasia of the smooth endoplasmic reticulum. Assays of liver extracts showed a specific methionine adenosyltransferase deficiency (range below that of a 2nd trimester fetus); activities of enzymes of the transsulfuration and remethylation pathways were normal. These findings collectively suggest that the defect is due to a genetic mutation rather than to a delay in enzymatic maturation or to an acquired disease.

7949 XERODERMA PIGMENTOSUM WITH LIVER INVOLVEMENT. *(E.)* Dupuy, J. M.; Lafforet, D.; Rachman, F. (INSERM, Parrot Hosp., Bicetre, France). *Helv. Paediatr. Acta* 29(3):213-219, 1974.

Cell viability following UV irradiation (2537Å, incident dose 8 erg/mm^2/sec) was assessed *in vitro* by the trypan blue exclusion test for peripheral lymphocytes from a 10-yr-old girl with xeroderma pigmentosum. The patient manifested liver involvement with hepatosplenomegaly, abnormal liver function tests, cholestasis with portal hypertension and deafness. Viability of control cells decreased slowly with increasing UV dosage: viability after exposure to 300 erg/mm^2 was 50% on day 5. In contrast, the survival fraction of the patient's cells decreased sharply with irradiation and the curve at 30 erg/mm^2 of UV was similar to that of control cells exposed to 300 erg/mm^2. Measurement of DNA synthesis by autoradiography following labeling with ^{3}H-thymidine showed similar rates for skin fibroblasts, hepatocytes and lymphocytes of normal donors and the xeroderma pigmentosum patient; after irradiation, there was a marked increase in average grain count of normal donor cells. There was no significant difference in average grain count between unirradiated and irradiated cells from the xeroderma pigmentosum patient, suggesting that xeroderma pigmentosum cells from liver, skin and lymphocytes are unable to repair DNA after UV irradiation.

7950 EFFECT OF DIPHENYLHYDANTOIN ON HEPATIC DRUG HYDROXYLATION. *(E.)* Petruch, F.; Schuppel, R. V. A.; Steinhilber, G. (Neurol. Clin., Univ. Tubingen, Germany). *Eur. J. Clin. Pharmacol.* 7(4):281-285, 1974.

The metabolic disposition of antipyrine (14 mg/kg p.o.) was examined in 8 male epileptics before and after 2.5-6 months of treatment with diphenylhydantoin (DPH, 300 mg/day). The average half-life of antipyrine fell from 10.0 ± 3.4 hr before treatment to 6.1 ± 1.6 hr after treatment. The amount of unchanged antipyrine excreted in urine decreased from 28.5 ± 12.1 mg/24 hr before treatment (2.8% of the dose administered) to 18.1 ± 10.2 mg/24 hr after treatment (1.8% of the dose). Similar results were obtained when the data were calculated on the basis of creatinine excretion. The amount of 4-OH-antipyrine excreted in urine increased from 185 ± 39 mg/24 hr before therapy (18% of the dose) to 300 ± 95 mg/24 hr after treatment with DPH (29% of the dose). In an additional epileptic patient who had Meulengracht's disease, the half-life of antipyrine decreased from 20.7 to 6.6 hr after 22 days treatment with DPH (300 mg/day); during the same time, the serum bilirubin concentration fell from 2.6 to 1.0 mg/100 ml. The results indicate that DPH enhances the activity of hepatic drug microsomal hydroxylating systems.

7951 VENTRAL PORTAL VEIN. *(E.)* Harell, G. (Stanford Univ. Sch. Med., Calif.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(2):369-373, 1974.

In 3 of the 10 basic variations seen in the human hepatic arterial blood supply, the portal vein runs ventral or in front of an aberrant right hepatic artery; in such instances the portal vein is termed a ventral portal vein. In 1 of these 3 variations (Type X variant), an aberrant right hepatic artery arises from the celiac axis independently of the common hepatic and courses dorsally or crosses behind the more ventrally positioned portal vein. In the other two (Types VII and VIIIA), an aberrant right hepatic artery arises from the superior mesenteric artery, proceeds upwards, and crosses behind a more ventrally located portal vein. Three cases involving these variations are discussed. In the case of a 59-yr-old woman, an aberrant right hepatic artery arose from either a short common hepatic artery or the celiac trunk and the portal vein probably crossed ventral to the aberrant right hepatic artery. Because of bleeding, the patient underwent splenectomy, a spleno-renal shunt being performed rather than a portacaval shunt. Had the latter been attempted, difficulty might have been encountered in bringing the ventral portal vein posteriorly. In the second case, a 62-yr-old woman had a visceral carcinoma involving an aberrant (Type X) right hepatic artery at the point where it crossed behind the portal vein; the ventral position of the portal vein in relation to the aberrant right hepatic artery suggested an anatomic basis for the lack of portal vein involvement. In a 55-yr-old with a Type X variant, the common hepatic artery and the origin of the ventral portal vein were both involved by a pancreatic carcinoma. The neoplasm also involved the origin of the aberrant right hepatic artery but spared the artery where it crossed behind the ventral portal vein. Awareness of the existence of a ventral portal vein may help in planning shunt surgery for portal hypertension.

7952 CHOLESTEROL ESTER STORAGE DISEASE: RADIOLOGICAL FEATURES. *(E.)* Carter, A. R.; France, N. E.; Lewis, B. W.; Shaw, D. G. (Queen Elizabeth Hosp. Children, London, England). *Pediatr. Radiol.* 2(2):135-136, 1974.

The rare condition of cholesterol ester storage disease was diagnosed in a 5-yr-old girl who developed hepatomegaly at the age of 3 yr and 8 months. She remained well until 5 yr of age when she also developed splenomegaly and an elevated serum cholestrol (312 mg%). X-ray of the abdomen showed extensive small areas of calcification scattered throughout the liver and a few small areas of calcification in the spleen. Serological tests were negative; serum, copper and iron were normal; and investigation of white blood cell enzymes ruled out glycogen storage disease. Open liver biopsy showed well-defined biliary cirrhosis with a large amount of lipid accumulation in hepatocytes and Kupffer cells. Biochemical analysis showed liver cholesterol ester levels about 200 times normal and slightly increased liver cholesterol and triglycerides. The basic metabolic defect in cholesterol ester storage disease is unknown. Of 5 reported cases, only one has died, of unrelated disease, suggesting a favorable prognosis.

7953 HEPATITIS-B ANTIGEN AND CIRRHOSIS IN BANTU PATIENTS WITH PRIMARY LIVER CANCER. *(E.)* Kew, M. C.; Geddes, E. W.; Macnab, G. M.; Bersohn, I. (Dept. Med., Univ. Witwaterswand, Johannesburg, South Africa). *Cancer* 34(3):539-541, 1974.

Hepatitis-B antigen (HBAg) was found in the serum of 30 of 75 (40%) Bantu patients with primary liver cancer, but in only 7% of 18,377 apparently healthy rural Bantu, confirming an association between this tumor and persistence of the hepatitis-B virus. No relation could be demonstrated between hepatitis-B antigenemia and α-fetoprotein, which was present in 77% of the patients. HBAg was not more common in the younger patients. In 60% of the patients, primary liver cancer coexisted with macronodular (postnecrotic) cirrhosis. HBAg was found in 45.6% of the patients with cirrhosis, but also in 31% of those without, an insignificant difference. These findings may indicate that persistence of the hepatitis-B virus is the cause or result of primary liver cancer, or that some immunologic defect is responsible for both. If the former, the virus must be directly oncogenic, in addition to having the potential to induce neoplasia indirectly *via* chronic parenchymal liver disease.

7954 ANGIOGRAPHY OF THE LIVER AND SPLEEN IN HODGKIN'S DISEASE. *(E.)* Jonsson, K.; Lunderquist, A. (Univ. Hosp., Lund, Sweden). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(4):789-792, 1974.

Angiography of the liver and spleen was performed in 18 patients with histologically proven Hodgkin's disease and the results were correlated with the findings at staging laparotomy, which included wedge biopsy of the liver and splenectomy. At angiography, nonspecific filling defects and dislocation of intrahepatic arteries were found in 1 patient with lymphoma in the liver. A 2nd patient with similar defects on angiography proved to have a smooth liver at laparotomy. Similar filling defects in the spleen are nonspecific and may occur in both involved and uninvolved cases. No specific angiographic pattern was seen in cases with epithelioid cell granulomas in the liver or spleen. An enlarged liver or spleen demonstrated either by palpation or by angiography is no proof of involvement and, at times, an apparently normal liver or spleen may actually be diseased. Thus, laparotomy remains the only reliable method of documenting organ involvement in lymphoma.

7955 A CLINICOPATHOLOGICAL REVIEW OF 100 CASES OF PRIMARY MALIGNANT TUMOURS OF THE LIVER.

(E.) MacSween, R. N. M. (Western Infirm., Glasgow, Scotland). *J. Clin. Pathol.* 27(8):669-682, 1974.

One hundred cases of primary malignant tumor of the liver coming to necropsy in the period 1900-1969 have been reviewed. The overall tumor incidence was 0.46% of all necropsies. The overall tumor incidence in hepatic cirrhosis was 12.3%, but the corresponding male and female incidences were 17.5 and 4.4%, resp. There was no significantly increased tumor incidence in hemochromatosis. An increasing incidence of primary malignant tumors of the liver has been noted since 1940 and appears to be due to a corresponding increase in incidence of hepatic cirrhosis (64% in this study). Hepatocellular carcinomas outnumbered cholangiocarcinomas by 8 to 1, were more common in males than females (6 to 1), and in 77% of cases occurred in cirrhotic livers. Tumors supervened as a complication of macronodular or predominantly macronodular cirrhotic patterns and were seen in 41 of 49 patients with this picture.

7956 ULTRASTRUCTURAL CHANGES IN LIVERS OF TWO PATIENTS WITH HYPERVITAMINOSIS A.

(E.) Hruban, Z.; Russell, R. M.; Boyer, J. L.; Glagov, S.; Bagheri, S. A. (Dept. Pathol., Univ. Chicago, Ill.). *Am. J. Pathol.* 76(3):451-468, 1974.

Liver tissue obtained by percutaneous biopsy of 2 patients (1 man and 1 woman, aged 63 yr and 54 yr, resp.) with hypervitaminosis A was studied by light and electron microscopy. Clinical manifestations in both patients included dry skin, hair loss, hepatosplenomegaly and ascites. Both had ingested excessive amounts of vitamin A for 5 to 8 yr. Direct vitamin A assays in liver biopsy specimens were 1,700 and 2,200 μg/g liver, as compared to controls of 100-130 μg/g. The principal distinctive ultrastructural changes observed were perisinusoidal fibrosis and massive accumulation of lipid-storing cells (Ito cells). The fibrosis consisted of a network of basement membranes with numerous bundles of collagen and reticulum fibrils. This network contained numerous Ito cells, and moderate numbers of lymphocytes, macrophoges and other mesenchymal cells. Impairment of blood flow by perisinusoidal fibrosis probably resulted in the secondary alterations in hepatocytes which included cellular atrophy and formation of cytoplasmic bullae.

7957 IMMUNOHISTOCHEMISTRY OF LIVER IN ALPHA$_1$-ANTITRYPSIN DEFICIENCY: A COMPARATIVE STUDY.

(E.) Palmer, P. E.; De Lellis, R. A.; Wolfe, H. J. (Tufts Univ. Sch. Med., Boston, Mass.). *Am. J. Clin. Pathol.* 62(3):350-354, 1974.

A retrospective light microscopic study was performed on liver tissue obtained at autopsy from 3 adults with α_1-antitrypsin deficiency and from 8 additional patients with a variety of hepatic diseases. Immunofluorescent and immunoperoxidase methods for the identification of α_1-antitrypsin-positive granules in liver cells were compared. In formalin-fixed frozen sections, specific intracellular globule staining was demonstrated in the deficiency state with all technics. While immunofluorescent methods failed to stain the globules in formalin-fixed, paraffin-embedded tissues, immunoperoxidase technics gave consistently positive and reproducible results. The immunoperoxidase technic utilizing an unlabeled antibody bridge was found to be better for demonstrating α_1-antitrypsin deposits in paraffin-embedded tissue specimens. The ability to detect α_1-antitrypsin deposits by the immunoperoxidase method enables retrospective analysis of paraffin-embedded tissues. The technique may also be applicable to ultrastructural analysis.

7958 THE SIGNIFICANCE OF LIPOPROTEIN X AND SERUM CHOLINESTERASE IN THE PREOPERATIVE DIAGNOSIS OF OBSTRUCTIVE JAUNDICE.

(Ger.) Prexl, H. J.; Petek, W. (Surg. Clin., Univ. Graz, Austria). *Chirurg* 44(7):310-313, 1973.

Cholinesterase activities were determined and lipoprotein-X (LP-X) concentrations measured by immunoelectrophoresis on sera from 178 patients who were scheduled to undergo biliary surgery. These included 33 patients who were suspected of having obstructive jaundice. The test for LP-X was negative in all of the 145 patients without jaundice, while LP-X concentrations of 5-46 mg/100 ml were found in 27 of the 33 jaundiced patients. At surgery, all of the patients who were LP-X-positive had extrahepatic biliary obstruction due to calculi or tumors. The 6 patients who were LP-X-negative all had parenchymal liver damage. Most LP-X-negative patients with moderately increased serum transaminase activities, alkaline phosphatase activities of up to 200 mU/ml, and serum cholinesterase activities of 1000-1600 mU/ml had cirrhosis. LP-X-positive patients were classified into 2 groups on the basis of their serum cholinesterase activities. Those with moderately elevated transaminase activities, greatly increased alkaline phosphatase values, and normal or slightly subnormal serum cholinesterase levels (1700 mU/ml) generally did not have tumors. A large decrease in the serum cholinesterase level (below 1200 mU/ml) was either a manifestation of a benign biliary obstruction which had caused secondary parenchymal liver damage or, more frequently, malignant tumors of the biliary tract or pancreas which caused extrahepatic biliary obstruction.

7959 METABOLIC CHANGES AFTER HEPATIC DEARTERIALIZATION IN MAN. *(E.)* Nagasue, N. (Saiseikai Yahata Hosp., Yahata, Kitakyushu, Japan). *Jap. J. Surg.* 3(3):173-183, 1973.

Diffuse liver cancer in 5 male patients was treated by hepatic dearterialization. Metabolic changes thus induced were examined for 3 weeks postoperatively. The transient rise of blood glucose level on the 1st postoperative day was more pronounced than in usual laparotomy cases, indicating glucose intolerance. Serum phospholipids and total cholesterol values decreased markedly, reaching the lowest level in the 2nd week. There was no definite tendency in the changes in serum triglycerides and free fatty acids levels. Serum albumin decreased markedly during the first 2 weeks in all cases, indicating impaired albumin synthesis. Serum α_2-globulin levels, however, showed a rapid increase during the same time period. Blood ammonia level remained unchanged in those without cirrhosis but increased in 1 case with cirrhosis. Thus, appropriate attention should be paid to the metabolic derangements occurring during the 1st 2 to 3 postoperative weeks after hepatic dearterialization.

7960 HEPATIC NEUROPATHY: A CLINICAL AND ELECTROPHYSIOLOGICAL STUDY. *(E.)* Kardel, T.; Nielsen, V. K. (Gentofte Hosp., Copenhagen, Denmark). *Acta Neurol. Scand.* 50(4):513-526, 1974.

The frequency and distribution of impaired nerve function were studied in 34 patients (16 women and 18 men, aged 21-68 yr) with severe chronic hepatic failure, 20 of whom had a surgical portacaval shunt. Clinical symptoms and signs were present in 23 patients and absent in 11. Eight patients complained of paresthesia in the feet, in 6 the ankle jerks were absent and the knee jerks absent or decreased, and in 21 the vibratory perception threshold (VTP) on the big toe was elevated. However, the nerve function of the arm was also impaired. During ischemia the rise in VTP on the index finger was delayed in 18 patients, including 7 without other clinical signs of neuropathy. In 14 patients, conduction velocity was decreased in the digit-wrist and the wrist-elbow sections of the median nerve; the decrease was accompanied by a reduction in amplitude and an increase in temporal dispersion of the action potentials. Only 6 of the 14 patients showed conduction velocity values below the lower normal limit. Average nerve conduction values in patients with (9) and without (5) a shunt did not differ significantly. In 8 patients the sensory threshold for electrical stimuli (digit 3) was elevated. There was no relation between impaired nerve function and routine liver function tests or the galactose elimination capacity, a measure of the functioning liver mass. Neurological findings occurred with equal frequency in patients with and without chronic alcoholism or a diabetic glucose tolerance test. The frequency of impaired nerve function indicates that a peripheral nerve dysfunction is an integral part of the severe chronic hepatic failure syndrome. The distribution of findings suggests that hepatic neuropathy results from metabolic inhibition of the nerve axon membrane function.

7961 DEGRADATION OF HUMAN α_1-ANTITRYPSIN BY HEPATOCYTE ACID CATHEPSINS: POSSIBLE ROLE IN CLINICAL α_1-ANTITRYPSIN DEFICIENCY. *(E.)* Sandhaus, R. A.; Janoff, A. (Hlth. Sci. Ctr., State Univ. New York, Stony Brook). *Am. Rev. Respir. Dis.* 110(3):263-272, 1974.

α_1-Antitrypsin was studied as an inhibitor or conversely as a substrate of hepatocyte lysosomal acid cathepsins. Granule hydrolases from hepatocyte-enriched preparations of the livers of fetal, neonatal, and adult rabbits were interacted at pH 3.0 with a fraction of human serum containing a molar excess of α_1-antitrypsin. In addition, a human liver was examined in a similar way. All granule extracts tested produced degradation of human serum proteins, including α_1-antitrypsin, within 1 hr as monitored by immunoelectrophoretic analysis. It was concluded that α_1-antitrypsin does not inhibit hepatocyte acid cathepsins at any of the stages of liver development tested, but rather that this serum glycoprotein is degraded by these acid proteases. In light of these findings, the most likely mechanism for intracellular α_1-antitrypsin accumulation involves hypersynthesis of α_1-antitrypsin as a result of lowered serum concentrations due to the lack of α_1-antitrypsin release from the endoplasmic reticulum. This model is supported by previously reported clinical findings.

7962 REYE'S SYNDROME. *(E.)* Brown, T.; Hug, G.; Bove, K.; Brown, H.; Lansky, L. (Children's Hosp. Res. Fdn., Cincinnati, Ohio). *Lancet* (7882):716-717, 1974.

The activity of ornithine transcarbamylase and carbamyl-phosphate synthetase in hepatic specimens from 4 patients with Reye's syndrome are reported. Mean activity of ornithine transcarbamylase and carbamyl-phosphate synthetase in Reye's syndrome was reduced to 37% and 57% of normal, resp. The activity for ornithine transcarbamylase was outside the 95% confidence limits of normal in one patient, and that for carbamyl-phosphate synthetase in two patients. In these cases, therapy with ornithine or arginine might be counterproductive.

7963 FOLLOW-UP OF PATIENT WITH PORTACAVAL SHUNT FOR THE TREATMENT OF HYPERLIPIDAEMIA. *(E.)* Starzl, T. E.; Chase, H. P.; Putnam, C. W.; Nora, J. J. (Univ. Colorado Med. Ctr., Denver). *Lancet* (7882):714-715, 1974.

A 17-month follow-up of a 12-yr-old girl with type IIa hyperlipoproteinemia who underwent end-to-side portacaval shunt in an attempt to lower cholesterol levels is reported. The patient had had a myocardial infarction prior to surgery. The preoperative angina pectoris has not recurred. Serum cholesterol levels have remained below 400 mg/100 ml. The mean postoperative serum cholesterol level has been 330 mg/100 ml, compared to a mean of 769 mg/ml prior to surgery. Coronary arteriograms obtained three months before the portacaval shunt revealed diffuse narrowing of the coronary arteries, and the circumflex artery was not displayed. Coronary studies 16 months after portacaval shunt revealed no diffuse narrowing in any of the three coronary arteries. The general internal dimensions would be considered normal except for three discrete areas of occlusive disease. It is suggested that homozygous type II patients who show evidence of cardiovascular disease and who have not adequately responded to lipid-lowering medication be considered for the portacaval shunt.

7964 HEPATIC AMOEBIASIS. A STUDY OF 32 CASES IN THE WESTERN CAPE. *(E.)* Naidoo, P. M.; Keeton, G.; Stein, L.; Kottler, R.; Horwitz, M. (Livingstone Hosp., Port Elizabeth, South Africa). *S. Afr. Med. J.* 48(27):1159-1160, 1974.

7965 AMEBIC LIVER ABSCESSES. REMOTE OCCURRENCE FOLLOWING METRONIDAZOLE THERAPY. *(E.)* Bindschadler, D. D. (no affil.). *Rocky Mt. Med. J.* 71(7):387-389, 1974.

7966 BRAIN ULTRASTRUCTURE IN REYE'S SYNDROME. *(E.)* Partin, J. C.; Schubert, W. K.; McLaurin, R. L.; Partin, J. S. (Children's Hosp. Res. Fdn., Univ. Cincinnati, Ohio). *Clin. Res.* 22(4):635A, 1974.

7967 PHARMACOKINETICS OF CLINDAMYCIN IN PATIENTS WITH LIVER DISEASE. *(E.)* Hinthorn, D. R.; Baker, L. H.; Romig, D. A.; Lui, C. (Univ. Kansas Med. Ctr., Kansas City). *Clin. Res.* 22(4):614A, 1974.

7968 PROTAMINE SULPHATE IN THE TREATMENT OF HEPATIC COMA. *(E.)* Steigmann, F.; Villa, F.; Pamukcu, F. (Cook County Hosp., Chicago, Ill.). *Clin. Res.* 22(4):636A, 1974.

7969 PROGRESS REPORT. ANTITRYPSIN AND THE LIVER. *(E.)* Brunt, P. W. (Dept. Med., Univ. Aberdeen, Scotland). *Gut* 15(7):573-580, 1974.

7970 HEPATIC BROM-SULPHTHALEIN GLUTATHIONE CONJUGATING ENZYME AND BILIRUBIN GLUCURONYL TRANSFERASE ACTIVITY IN HEPATIC DISORDERS WITH PARTICULAR REFERENCE TO IDIOPATHIC PORTAL HYPERTENSION AND THE EFFECT OF PHENOBARBITONE. *(E.)* Datta, D. V.; Chuttani, P. N.; Singh, S.; Nair, C. R. (Postgrad. Inst. Med. Ed. Res., Chandigarh, India). *Clin. Sci. Mol. Med.* 47(3):16P, 1974.

7971 A SIMPLIFIED TECHNIQUE FOR HEPATIC RESECTION: THE CRUSH METHOD. *(E.)* Lin, T. Y. (Natl. Taiwan Univ. Hosp., Taipei). *Ann. Surg.* 180(3):285-290, 1974.

7972 HEPATECTOMY IN THE TREATMENT OF HYDATID CYSTS OF THE LIVER. *(Sp.)* Camprodon, R.; Salva, J. A.; Guerrero, J. A.; Jornet, J. (Francisco Franco Munic. Sanit., Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 43(4):365-378, 1974.

7973 PSEUDOTUMORAL HEPATIC ACTINOMYCOSIS FOLLOWING CHOLECYSTECTOMY. *(Ger.)* Fleischer, E. M.; Kuhn, H. (St. Georg Reg. Hosp., Leipzig, Germany). *Zentralbl. Chir.* 98(34):1213-1215, 1973.

7974 A CASE OF INTRAHEPATIC CHOLESTASIS IN A 10-YEAR-OLD BOY TREATED BY EXTERNAL DRAINAGE OF THE COMMON BILE DUCT. *(Pol.)* Romanski, A.; Romanska, K.; Smigla, K. (Silesian Acad. Med., Zabrze, Poland). *Pediatr. Pol.* 48(10):1271-1274, 1973.

7975 INTRAHEPATIC CHOLESTASIS FOLLOWING OVOSISTON [MESTRANOL AND CHLORMADINONE ACETATE] THERAPY. *(Ger.)* Kraatz, G.; Linke, A. (Med. Clin. Polyclin., Ernst Moritz Arndt Univ., Greifswald, Germany). *Z. Aerztl. Fortbild.* 67(23):1194-1196, 1973.

7976 PROGNOSIS OF HEPATIC SCHISTOSOMIASIS DUE TO Schistosoma mansoni. *(Fr.)* Le Bras, M.; Bertrand, E. (Hosp., Univ. Abidjan, Ivory Coast). *Sem. Hop. Paris* 50(27):1887-1892, 1974.

7977 DIAGNOSTIC PROBLEMS IN SCHSTOSOMIASIS OF THE LIVER. *(Fr.)* Le Bras, M.; Lesquerre, C.; Lamouche, P.; Loubiere, R.; Ette, M.; Beda, B.; Martine, J.; Bertrand, E. (Hosp., Univ. Abidjan, Ivory Coast). *Sem. Hop. Paris* 50(27):1877-1886, 1974.

7978 CHRONIC LIVER DISEASE: ETIOLOGICAL AND PATHOGENETIC PRINCIPLES FOR CLASSIFYING IT. *(Pol.)* Gorski, M. M. (Acad. Med., Gdansk, Poland). *Pol. Arch. Med. Wewn.* 50(9):925-935, 1973.

7979 DIET AND CHRONIC LIVER DISEASE. *(Pol.)* Hasik, J. (Med. Acad., Poznan, Poland). *Pol. Arch. Med. Wewn.* 50(9):965-972, 1973.

7980 CLINICAL AND EXPERIMENTAL NOTES ON PRESENT PROBLEMS IN THE TREATMENT OF HEPATIC FAILURE. *(It.)* Motta, G.; Nicolini, A.; Catrambone, G.; Nahum, M.; Venturini, M.; Piombo, I.; Bastiani, G. (Inst. Spec. Surg. Path., Univ. Genoa, Italy). *Minerva Med.* 65(29):1609-1630, 1974.

7981 HEPATOMA: HEMOPERITONEUM AND HEMOTHORAX AS PRESENTING SYMPTOMS. STUDY OF TWO ORIGINAL CASES. *(Sp.)* Barreiro Alvarez, F.; Mateo Martinez, A.; Zarazaga Monzon, A.; Alvarez de la Marina, J. R. (La Paz Munic. Sanit., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 44(1):73-84, 1974.

7982 Fasciola hepatica. REPORT OF A CASE WITH COMMON DUCT DISTOMIASIS. *(Sp.)* Nava, C.; Metlich, M. A.; Marti, M. M. (Med. Sch., Univ. San Luis Potosi, Mexico). *Rev. Invest. Clin.* 26(2):181-185, 1974.

7983 SERUM AND URINARY LEVELS OF SODIUM, POTASSIUM, AND CHLORIDE AND LIVER FUNCTION IN YOUNG CHILDREN WITH TOXIC PNEUMONIA. *(Ukr.)* Savin, V. V. (Clin. Sanit. Children, Eupatoria, USSR). *Pediatr. Akush. Ginekol.* 36(1):28-29, 1974.

7984 D-XYLOSE ABSORPTION IN YOUNG CHILDREN WITH HEPATOBILIARY DISEASE AND GIARDIASIS. *(Rus.)* Serebriakova, N. N.; Golovina, N. E.; Titova, L. S.; Beier, L. V.; Patarakina, A. A.; Sokolova, A. S.; Prozorova, V. P. (Gor'ki Sci. Res. Inst. Pediatr., USSR). *Pediatriia* (7):40-43, 1973.

7985 BILE SECRETORY FUNCTION IN KIDNEY DISEASE IN CHILDREN. *(Rus.)* Borovkova, L. A. (no affil.). *Pediatriia* (7):65-66, 1973.

7986 GLUTAMINE SYNTHETASE ACTIVITY IN THE LIVER IN PRIMARY GOUT. *(Ger.)* Becher, H.; Mecke, D.; Kleinen, R.; Mertz, D. P. (Biochem. Inst., Univ. Freiburg, Germany). *Klin. Wochenschr.* 52(8):396-397, 1974.

7987 CONGENITAL HEPATIC FIBROSIS ASSOCIATED WITH ECTASIA OF THE RENAL TUBULES WITH RENAL SYMPTOMS AT THE ONSET. *(It.)* Maggioni, G.; Ceccamea, A.; Iannaccone, G. (1st Pediatr. Clin., Univ. Rome, Italy). *Prog. Med. (Roma)* 29(2):51-59, 1973.

See also, 7465, 7469, 7472, 7641, 7652, 7654, 7655, 7656, 7678, 7679, 7680, 7681, 7682, 7683, 7684, 7685, 7687, 7812, 7996, 8008, 8032, 8036, 8073, 8127, 8135, 8136.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

7988 AN ENZYME INDUCTOR COMBINATION FOR THE PREVENTION OF HYPERBILIRUBINEMIA IN PREMATURE INFANTS. *(E.)* Hinkel, G. K.; Kintzel, H. W.; Schwarze, R.; Handel, A. (Pediatr. Hosp., Dresden, Germany). *Acta Paediatr. Scand.* 63(3):393-397, 1974.

The effectiveness of phenobarbital and nikethamide, an enzyme inductor combination, in controlling physiologic hyperbilirubinemia in premature infants was studied. The infants were divided into 5 groups: Group I infants were given phenobarbital (10 mg/kg/day for 6 days); group II, phenobarbital (10 mg/kg/day) plus nikethamide (100 mg/kg/day) each for 6 days; group III, phenobarbital (10 mg/kg) plus nikethamide (25 mg/kg) at the 12th, 24th, and 36th hr of age; group IV, phenobarbital (20 mg/kg on day 1, 10 mg/kg on days 2 and 3) plus nikethamide (100 mg/kg/day, days 1-4); group V, phenobarbital (10 mg/kg/day, days 1-3) plus nikethamide (100 mg/kg/day, days 1-4). All medication was given p.o. The bilirubin-depressive effect of phenobarbital combined with nikethamide was stronger than that of phenobarbital alone. Short-term induction using phenobarbital plus nikethamide was accompanied by the highest bilirubin concentrations. The sedative action of phenobarbital was adequately offset by nikethamide when used in combination dosages of 10 mg/kg and 100 mg/kg, resp. Nikethamide did not cause irritability. However, long-term application was followed by an emerging dominance of barbiturate action which was attributed to phenobarbital accumulation. The combination used in group III appeared ineffective. Group IV suffered a marked barbiturate effect. The combination used in group V was well tolerated, and prophylactic routine use of the enzyme inducer combination in this manner is the recommended method to prevent development of hyperbilirubinemia in premature infants. Exchange transfusion was no longer necessary in 400 premature infants who received this combination. However, phototherapy is considered the most suitable method to treat a pre-existing hyperbilirubinemia.

7989 EFFECT OF PHENOBARBITONE ON PHYSIOLOGICAL JAUNDICE. *(E.)* Singh, M.; Naryanan, P. (All India Inst. Med. Sci., New Delhi). *Indian Pediatr.* 11(1):43-45, 1974.

A prospective controlled trial was conducted to assess the efficacy of postnatal administration of phenobarbital for its bilirubinopenic effects. Sodium phenobarbital (7.5 mg twice a day, p.o., starting at 12 hr of age) was administered to 65 of 130 babies with birth weight over 2200 g. The remaining 65 infants served as controls. The mean total serum bilirubin on day 4 was 5.01 mg% in babies receiving phenobarbital; 6.06 mg% in controls. The unconjugated bilirubin was significantly lower in infants receiving phenobarbital; the level of conjugated bilirubin was higher, but not significantly so. The greater reduction of unconjugated bilirubin suggests that hepatic uptake and conjugation of bilirubin were promoted by phenobarbital treatment. Of the 65 infants receiving phenobarbital, 41 (63%) developed clinical jaundice (bilirubin over 4 mg%) compared with 50 babies (77%) in the control group. Serum bilirubin did not exceed 10 mg% in any babies receiving phenobarbital, but did so in 5 control babies. No side effects such as inactivity, poor feeding, excessive sleep, respiratory depression or aspiration were noted in any baby receiving phenobarbital. Despite its bilirubinopenic effectiveness, the routine use of phenobarbital is not recommended in term babies. It should be restricted to cases of feto-maternal blood group incompatability and immaturity.

7990 HEPATIC MICROSOMAL DRUG OXIDATION AND ELECTRON TRANSPORT IN NEWBORN INFANTS. *(E.)*

Aranda, J. V.; MacLeod, S. M.; Renton, K. W.; Eade, N. R. (Montreal Child. Hosp., Canada). *Pediatr. Pharmacol. Ther.* 85(4):534-542, 1974.

The activities of drug-metabolizing enzymes, NADPH cytochrome c reductase, NADPH oxidase, aminopyrene-*N*-demethylase, and aniline-*p*-hydroxylase, as well as cytochrome P-450 levels, were measured in liver microsomal fractions from 4 premature and 3 newborn infants and from 4 adults. All the above-mentioned enzymes, except aminopyrene-*N*-demethylase, showed increasing specific activity with advancing fetal and postnatal age. A positive correlation was found between 3 components of the hepatic microsomal mixed function oxidase system (NADPH oxidase, NADPH cytochrome c reductase, and cytochrome P-450) and aniline-*p*-hydroxylase. However, only NADPH oxidase activity correlated with aminopyrene-*N*-demethylase activity. The rate of substrate oxidation and the activities of the components of the microsomal electron transport pathway in newborns were lower than comparable values in the adults. These findings provide a possible explanation for the transient deficiency in drug metabolism seen in newborn infants.

7991 DRUGS AND THE LIVER - I. EFFECTS OF GLUTETHIMIDE AND PHENOBARBITAL ON HEPATIC BILIRUBIN CLEARANCE, PLASMA BILIRUBIN TURNOVER AND CARBON MONOXIDE PRODUCTION IN MAN. *(E.)*

Blaschke, T. F.; Berk, P. D.; Rodkey, F. L.; Scharschmidt, B. F.; Collison, H. A.; Waggoner, J. G. (Natl. Cancer Inst., NIH, Bethesda, Md.). *Biochem. Pharmacol.* 23(20):2795-2806, 1974.

The effects of glutethimide and phenobarbital (2-4 mg/kg/day) on the plasma unconjugated bilirubin concentration, hepatic bilirubin clearance, and plasma bilirubin turnover were determined in 19 patients (14 males and 5 females) with mild chronic unconjugated hyperbilirubinemia (Gilbert's syndrome) and 11 normal volunteers. Hepatic bilirubin clearance and plasma bilirubin turnover were calculated from plasma radiobilirubin disappearance curves obtained before and during drug administration. The response to both drugs was essentially identical. During administration, the patients with Gilbert's syndrome attained a new steady state in which the plasma unconjugated bilirubin concentration was 30 ± 2% and the hepatic bilirubin clearance was 314 ± 25% of baseline. In normal volunteers, the plasma unconjugated bilirubin concentration fell to 65 ± 6% while the hepatic bilirubin clearance increased to 135 ± 9% of baseline during drug administration. Although neither total red cell volume nor the half-life of ^{51}Cr-labeled erythrocytes was altered by either agent, daily plasma bilirubin turnover fell significantly to 87 ± 4% of baseline in the 30 subjects studied, and endogenous carbon monoxide production, which provides an independent estimate of the rate of heme degradation and bilirubin formation, was 93 ± 5% of control. These results indicate that the principal factor responsible for the reduction in plasma unconjugated bilirubin concentration during phenobarbital or glutethimide administration is the acceleration of hepatic bilirubin clearance. This accounts for more than 95% of the reduction in bilirubin concentration observed in patients with Gilbert's syndrome and an average of 70% of the reduction noted in normal volunteers. This is the first study to detail quantitative alterations in hepatic bilirubin clearance produced in a large number of individuals by drugs. The observation of an inverse relationship between baseline values for bilirubin clearance and the percentage increase in this parameter achieved during drug administration suggests that the drug effects are related to induction of a protein whose level is under genetic control. No association between phenobarbital or glutethimide administration and increased bilirubin or carbon monoxide production was noted. The possibility that a fall in the load of bilirubin presented to the liver might contribute to the reduction in plasma bilirubin concentration during drug administration is an important new observation. Use of these agents may increase the efficiency of the liver in excreting the bilirubin of hepatocellular origin directly into the bile without prior reflux to the plasma.

7992 PLASMA CONCENTRATIONS OF PHENOBARBITAL IN THE NEONATE DURING PROPHYLAXIS FOR NEONATAL HYPERBILIRUBINEMIA. *(E.)*

Wallin, A.; Jalling, B.; Boreus, L. O. (Danderyd Hosp., Stockholm, Sweden). *J. Pediatr.* 85(3):392-397, 1974.

Plasma concentrations of phenobarbital were measured during a routine prophylaxis program. Eleven newborn infants without signs of disease during the first hours of life were given a first meal (5% glucose) at the age of 4 hr and thereafter increasing amounts of breast milk from about 25 mg/kg on day 1 to about 100 mg/kg on day 8, in some cases replaced by equal amounts of formula. Each infant received a first dose of phenobarbital (5 mg/kg, i.m.) at 1-4 hr of age. On days 2 to 7 phenobarbital (5 mg/kg, p.o.) was given once daily. Daily determinations of plasma phenobarbital were made with a gas chromatographic micromethod. The total plasma concentration of phenobarbital increased throughout the period of treatment. Steady-state conditions were not generally achieved. The phenobarbital peak level in plasma always occurred later than that of bilirubin. The individual plasma curves show striking conformity during the week of phenobarbital administration, suggesting uniform intestinal absorption in these infants. The half-lives of the drug during post-treatment phase varied between 69 and 165 hr. The rate of disposition from plasma was not related to age of gestation, recorded maternal medication, or smoking habits, nor to the maximum plasma concentrations of phenobarbital and/or bilirubin in the infant. Plasma concentrations of phenobarbital during the last days of treatment ranged between 20 and 30 μg/ml. No obvious adverse effects were noted. However, minor effects on the behavior of the infants such as changes in feeding times or in spontaneous activity could not be excluded. It is suggested that dosage regimens should be so constructed that the drug may exert its maximal effect on bilirubin concentration very early after birth.

7993 INFLUENCE OF PREVIOUS ORAL CONTRACEPTION AND MATERNAL OXYTOCIN INFUSION ON NEONATAL JAUNDICE. *(E.)* Gould, S. R.; Mountrose, U.; Brown, D. J.; Whitehouse, W. L.; Barnardo, D. E. (Queen Mary's Hosp., London, England). *Br. Med. J.* 3(5925): 228-230, 1974.

The relation between maternal and neonatal serum bilirubin levels, maternal oral contraceptive history, maternal exposure to oxytocic agents immediately preceding delivery, and the method of feeding in the first six days of life was investigated in 181 mothers and neonates. Oxytocin (Syntocinon) was administered i.v. to 100 of the mothers as a routine measure to expedite delivery. Epidural anesthesia with bupivacaine was used in 109 of the mothers at the time of delivery. No differences were found on day 1 or day 6 between the neonatal serum bilirubin levels in babies grouped according to maternal oral contraception history and method of feeding. A comparison between the serum bilirubin levels of babies whose mothers had stopped taking oral contraceptives 3 months or less before conception and those whose mothers had stopped contraceptives more than 3 months before conception showed no significant differences. Nor was a difference noted when these 2 groups were compared to babies whose mothers did not use oral contraceptives at all. Neither the use of oxytocin during labor nor the use of epidural anesthesia influenced the neonatal serum bilirubin level. There was no difference in serum bilirubin level between breast-fed and bottle-fed infants, nor did birth weight seem to be of importance. It was noted that breast-fed babies born to mothers previously taking oral contraceptives were slightly but significantly heavier by about 250 g.

7994 PHOTOTHERAPY, PHENOBARBITONE AND PHYSIOLOGICAL JAUNDICE IN THE NEWBORN INFANT. *(E.)* Martin, J. R. (Natl. Women's Hosp., Auckland, New Zealand). *NZ Med. J.* 79(517):1022-1024, 1974.

A clinical trial was conducted in which the effects of phototherapy and phenobarbital administration on serum bilirubin levels were determined in infants who had developed clinically apparent jaundice due to physiological causes. The infants were divided into 3 groups: group 1 (35 infants) received only routine nursery care; group 2 (34 infants) received routine care plus continuous phototherapy; group 3 (31 infants) received routine care and continuous phototherapy plus phenobarbital administered at 8 doses of 8 mg/hr if the birth weight was 3 kg or more, or 8 doses of 2 mg/kg/hr if the birth weight was under 3 kg. The initial dose was given i.m.; subsequent doses, p.o. A significant reduction in the maximum bilirubin level was achieved in both groups having phototherapy when compared to controls, but the administration of phenobarbital was without additional benefit. Maximum bilirubin levels were reached significantly earlier in both groups having phototherapy. The duration of phototherapy required was not significantly different between groups 2 and 3. Exchange transfusion was required for 3 babies in group 1, none in group 2, and 1 in group 3. Respiratory depression was no more frequent in groups 2 and 3 than in group 1. No cases of abnormal pigmentation as a result of phototherapy were noted; however, in all cases the hyperbilirubinemia was predominantly of the indirect type. On occasions the premature discontinuation of phototherapy caused a rise in the bilirubin level, usually of small magnitude. Under the conditions of this trial, phenobarbital administration begun after an infant has become jaundiced due to physiological causes appears of no significant benefit, while the regimen of phototherapy described here was of significant benefit in the control of hyperbilirubinemia due to physiological causes. However, the long term effect of phototherapy on the growth and development of treated babies has not yet been adequately evaluated.

7995 EFFECT OF PHOTOTHERAPY IN PRETERM INFANTS ON GROWTH IN THE NEONATAL PERIOD. *(E.)* Wu, P. Y. K.; Lim, R. C.; Hodgman, J. E.; Kikosky, M. J.; Teberg, A. J. (Univ. Southern California Sch. Med., Los Angeles). *J. Pediatr.* 85(4):563-566, 1974.

See also, 7478, 8024, 8049.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

7996 AN INDUSTRIAL OUTBREAK OF TOXIC HEPATITIS DUE TO METHYLENEDIANILINE. *(E.)* McGill, D. B.; Motto, J. D. (Mayo Clin., Rochester, Minn.). *N. Engl. J. Med.* 291(6):278-282, 1974.

Over a 6-yr period, hepatitis developed in 12 male workers (aged 20-36 yr) exposed to an epoxy resin, *p,p*'-diaminodiphenylmethane. The clinical pattern was a short prodrome, severe right upper-quadrant pain, high fever, and chills, with subsequent jaundice. All patients recovered by 7 weeks; and when reexamined 9 months to 5 1/2 yr later, all were in excellent health without clinical or biochemical evidence of chronic liver disease. Circumstantial evidence suggested that the skin was the major route of entry: each worker had at least 1 hand in *p,p*'-diaminodiphenylmethane for several hr during an 8-hr shift. The cloth gloves worn by the workers are ineffective barriers to aromatic amines. A 13th worker in another factory also had hepatitis after working with *p,p*'-diaminodiphenylmethane; he may have inhaled toxic amounts. Although *p,p*'-diaminodiphenylamethane is cirrhotogenic, there is little evidence that it is carcinogenic in animals. Therefore, it is unlikely that the chance of cancer developing in the workers had been increased by the exposure and toxic hepatitis.

7997 TOLAZAMIDE HEPATOTOXICITY. *(E.)* Van Thiel, D. H.; De Belle, R.; Mellow, M.; Widerlite, L.; Philipps, E. (Boston Univ. Sch. Med., Mass.). *Gastroenterology* 67(3):506-510, 1974.

The first case of documented hepatocellular toxicity secondary to the oral hypoglycemic agent, tolazamide, is reported in a 62-yr-old man with a 9-yr history of diabetes. The patient developed clinical jaundice 1 month after starting tolazamide (500 mg/day). He was otherwise asymptomatic and denied exposure to jaundiced persons, shellfish, parenteral drugs, or alcohol. Physical examination revealed jaundice and slight hepatomegaly. The patient had a negative test for α_1-fetoprotein, 5'-nucleotidase, and Australia antigen. Liver scan was normal. Duodenoscopy with retrograde cannulation showed a patent common bile and pancreatic duct. Percutaneous liver biopsy showed marked centrilobular necrosis with prominent pigment phagocytosis but no Councilman-like bodies. There was prominent centrilobular cholestasis. Jaundice persisted for 2 months after tolazamide was discontinued.

7998 CRYPTOCOCCAL HEPATITIS MIMICKING PRIMARY SCLEROSING CHOLANGITIS. *(E.)* Lefton, H. B.; Farmer, R. G.; Buchwald, R.; Haselby, R. (Cleveland Clin. Fdn., Ohio). *Gastroenterology* 67 (3):511-515, 1974.

A case of cryptococcal hepatitis which initially mimicked primary sclerosing hepatitis is reported in a 25-yr-old man. The patient initially presented with anorexia, vomiting, and right upper quadrant pain not related to meals. Physical examination revealed scleral icterus, right upper quadrant tenderness, and no hepatosplenomegaly. Laparatomy showed thickened cystic and common ducts and small yellowish nodules on the liver surface and on a periductal lymph node. Liver biopsy revealed disruption of normal architecture with extensive inflammatory infiltrate and cholestasis. There was no liver necrosis. The patient was placed on prednisone (40 mg/day followed by 20 mg/day) maintenance therapy postoperatively but was readmitted 1 month later with generalized cephalgia, agitation, and disorientation. India ink preparation of spinal fluid obtained by lumbar puncture showed cryptococcus. Spinal fluid cultures grew *Cryptococcus neoformans*. Repeat study of the original liver biopsy specimen after using Gridley's stain for fungi showed encapsulated yeast-like organisms. The patient was treated successfully with intrathecal and i.v. amphotericin B (15.65 mg and 279 mg, resp.) and p.o. 5-fluorocytosine (379.5 g). Repeat liver biopsy was negative.

7999 METHYLDOPA LIVER DAMAGE. *(E.)* Toghill, P. J.; Smith, P. G.; Benton, P.; Brown, R. C.; Matthews, H. L. (Gen. Hosp., Nottingham, England). *Br. Med. J.* 3(5930):545-548, 1974.

Twenty patients are described in whom liver damage appeared to be directly related to the administration of methyldopa. Sixteen had hepatitic syndromes from which all but one recovered within 3 weeks after stopping methyldopa; the exception recovered after 2 months. Four of the patients had recurrences of jaundice after a second course of the drug. Features suggestive of active chronic hepatitis were found in 2 patients. There were 2 deaths attributed to methyldopa, 1 of these being in a patient with preexisting undiagnosed macronodular cirrhosis. These findings show that methyldopa is undoubtedly hepatotoxic. The nature of the hepatic response to methyldopa remains obscure; the results of this series point to a wide spectrum of reactions both clinically and histologically.

8000 CHOLESTATIC JAUNDICE DUE TO METHYLDOPA. *(E.)* Hoffbrand, B. I.; Fry, W.; Bunton, G. L. (Whittington Hosp., London, England). *Br. Med. J.* 3(5930):559, 1974.

A case report is presented of a 51-yr-old woman known to have hypertension for a number of years and who developed cholestatic jaundice following administration of methyldopa. After taking methyldopa 250 mg 3 times daily for two months, the patient was found to be jaundiced with a just palpable, nontender liver; there was no fever, the spleen and gallbladder were not palpable, and there were no signs of hepatocellular dysfunction or hypertensive vascular disease. One week after discontinuing the drug, serum bilirubin was 18 mg/100 ml and another week later was 23.4 mg/100 ml compared to 11.3 mg/100 ml prior to drug discontinuance. Within another week, the serum bilirubin was 20 mg/100 ml. At laparotomy the liver and extrahepatic bile ducts looked normal; the spleen was not enlarged. The patient made an uneventful recovery and the jaundice gradually receded. Within three months of drug withdrawal, the serum bilirubin was 1.1 mg/100 ml with normal liver enzymes and no bile in the urine. Although the patient's jaundice deepened after withdrawal of the drug it was probably about to remit at the time of the laparotomy which might have been prevented had it been known that methyldopa can produce cholestatic jaundice.

8001 ONSET OF POSTOPERATIVE JAUNDICE RELATED TO ANAESTHETIC HISTORY. *(E.)* McPeek, B.; Gilbert, J. P. (Massachusetts Gen. Hosp., Boston). *Br. Med. J.* 3(5931):615-617, 1974.

An analysis of 182 cases (67 fatal and 115 nonfatal) from the U.S. National Halothane Study showed the interval to the onset of jaundice after one exposure to halothane (91 cases) to be significantly shorter

(1.5 days) than the interval for those having had multiple exposures to the agent. These findings are in contrast to other recently published results possibly because the data in the four published reports examined were drawn from voluntary input with no control over bias. Thirty-three cases of jaundice after the use of other anesthetic agents are also reported.

8002 METHODOLOGY OF EPIDEMIOLOGIC STUDIES ON DRUG HEPATOTOXICITY.

(Fr.) Plomteux, G. (Med. Chem. Lab., Liege, Belgium). *Sem. Hop. Paris* 50(28):1947-1952, 1974.

See also, 7474, 7502, 7574, 7577.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

8003 HEPATIC WASH-OUT CURVES OF ^{85}Kr AND ^{133}Xe AFTER RETROGRADE HEPATIC VENOUS INJECTIONS IN PATIENTS WITH INFECTIOUS HEPATITIS AND IN CONTROLS.

(E.) Lundbergh, P.; Strandell, T. (Roslagstull Hosp., Stockholm, Sweden). *Scand. J. Clin. Lab. Invest.* 33(3):277-285, 1974.

The disappearance rates of ^{85}Kr and ^{133}Xe from the liver after their administration by retrograde simultaneous hepatic venous injection were studied in 8 male patients with infectious hepatitis and 10 healthy male controls. Since xenon has a higher affinity than krypton for fat, the quotient between the half-times of the two labels was used to calculate the hepatic fat content as well as the partition coefficients of the isotopes between the hepatic tissue and blood. The estimated hepatic fat content was significantly higher in the hepatitis patients (5.8%) than in the controls (3.6%). Among the patients, the hepatic fat content was highest in those with the least severe abnormal findings. The partition coefficients of krypton and xenon were 1.09 and 1.13, resp., in the controls and 1.25 and 1.41, resp., in the patients. The differences were significant. The isotope clearances seemed to overestimate the average perfusion coefficient by 25% as indicated by the total hepatic blood flow data and expected liver weights; this might be explained in terms of local hyperemia in the injected areas. This method can be efficaciously used to estimate partition coefficients and hepatic fat content.

8004 THE ROLE OF IMMUNOLOGICAL MECHANISMS IN ACUTE AND CHRONIC HEPATITIS.

(E.) Eddleston, A. L. W. F. (King's Coll. Hosp., London, England). *Postgrad. Med. J.* 50(584):348-353, 1974.

Carriers of hepatitis B antigen (HBAg) include apparently healthy persons, a proportion of whom have asymptomatic liver disease. The frequency of the carrier state increases with immunological deficiency. The fact that a symbiotic union can exist implies that the hepatitis B virus itself is not damaging to liver cells and that the hepatocellular damage in some patients with acute hepatitis is associated with some indirect mechanism triggered by the presence of the virus. Preliminary findings support the possibility that the hepatocellular necrosis which accompanies acute hepatitis may be induced by immunological reactions directed against viral antigenic determinants on the surface of infected cells. Immunological reactions may also be implicated in the pathogenesis of active chronic hepatitis. A liver-specific antigen has recently been isolated from the human liver; it is a lipoprotein thought to be a normal constituent of the hepatocyte plasma membrane. Sensitization to this lipoprotein has been found in a high percentage of patients with active chronic hepatitis, the incidence of sensitization being much higher among patients not being treated with immunosuppressive drugs. Sensitization has been detected in only a very low percentage of control subjects. Hypothetically, an altered liver-specific protein induced by an exogenous stimulus might cross react with the normal protein leading to increasing liver cell destruction; the autoimmune reaction might be vigorous and long-lasting in cases of an abnormal immune system.

8005 SUBTYPE AND TRANSMISSION OF HEPATITIS B VIRUS IN TWO CLOSED INSTITUTIONS.

(E.) Edlund, A.; Magnius, L. O. (Acad. Hosp., Uppsala, Sweden). *Scand J. Infect. Dis.* 6(3):217-221, 1974.

In less than 1 yr, 5 cases of hepatitis B occurred among patients and staff at an institution for the mentally retarded. The common source of infection was thought to be the only carrier of hepatitis B antigen (HBAg) among 13 patients with Down's syndrome. Five months before the 1st case of hepatitis B, this patient had been transferred from another institution where 10 cases of hepatitis B occurred before or within 4 months after her transfer. An 11th patient became ill with hepatitis B 2 yr after she left. All 16 patients and the presumed source of infection were HBAg-positive and carried the subtype *ad*. This subtype was also found in 3 HBAg-positive patients with Down's syndrome at the 2nd institution and in 63 HBAg carriers at 5 other institutions. Persistent HBAg carriers among patients with Down's syndrome evidently present a great risk for transmitting hepatitis B in contrast to healthy carriers in the normal population. An immunodeficient state in Down's syndrome patients might be the cause of antigenemia in Down's syndrome being associated with hepatocellular injury and persistence of infectivity. This immunodeficiency state is presumably also the basis for the absence of overt hepatitis in these carriers. The exclusive occurrence of subtype *ad* at institutions for the mentally retarded contrasts with the predominance of subtype *ay* among cases of acute hepatitis B in Sweden.

8006 ROLE OF HEPATITIS-B ANTIGEN CARRIERS IN NON-PARENTERAL TRANSMISSION OF THE HEPATITIS-B VIRUS. *(E.)* Heathcote, J.; Gateau, P.; Sherlock, S. (Roy. Free Hosp., London, England). *Lancet* (7877):370-371, 1974.

Tests for hepatitis B antigen (HBAg) and hepatitis B antibody (HBAb) were run on sera from 54 household contacts of 29 HBAg carriers. Of the carriers, 11 were presumed "healthy" since they had no clinical or biochemical evidence of impaired liver function although they remained HBAg-positive for 6 months or more. The remaining carriers either had cirrhosis (12 cases) or chronic persistent hepatitis (6 cases). Controls consisted of 29 age- and sex-matched volunteers and 61 household contacts. While none of the household contacts of the 11 "healthy" carriers were HBAg-positive and only 1 contact was HBAb-positive, 3 of the 35 contacts of HBAg-positive subjects with chronic liver disease were HBAg-positive and 13 of the other contacts were HBAb-positive. All 29 controls and their household contacts were HBAg-negative and, except for 1 contact, none were HBAb-positive. Statistical analysis of serological results revealed that the contacts of carriers with chronic liver disease were at greater risk of presumed non-parenteral exposure to HBAg than were contacts of "healthy" HBAg carriers. This was most often demonstrated by the presence of HBAb, sometimes in high titers, in sera from contacts of HBAg carriers with chronic liver disease. Although it has been suggested that the greater infectivity of blood from HBAg carriers with chronic liver disease may be due to the presence of more circulating large Dane particles than are present in blood from "healthy" carriers, electron microscope studies of sera from several HBAg carriers, both "healthy" and with chronic liver disease, failed to show any correlation between the type of carrier and the presence of Dane particles. HBAg and HBAb were more commonly found in sera from sexual contacts of HBAg carriers than in sera from blood relative contacts, but the difference in findings between these 2 groups of contacts was not statistically significant.

8007 HEPATITIS B AND SERUM DNA POLYMERASE ACTIVITIES IN CHIMPANZEES. *(E.)* Bradley, D. W.; Maynard, J. E.; Berquist, K. R.; Krushak, D. H. (Ctr. Dis. Control, Phoenix, Arizona). *Nature (Lond.)* 251(5473):356-357, 1974.

Four susceptible chimpanzees were inoculated i.v. with sera containing hepatitis B antigen and monitored by radioimmunoassay for serum HBAg and corresponding antibody during the course of infection. Three developed infections characterized by the occurrence of transient HBAg followed by anti-HBAg production. In all 4 animals spikes of DNA polymerase activity were found, the 1st increases being uniformly observed between the 20th and 40th days after inoculation. In the 3 animals which experienced antigenemia and hepatitis, the 1st spikes in DNA polymerase either closely preceded or paralleled the 1st appearance of HBAg and always occurred before 1st increases in transaminase levels. These spikes may represent replication of viral DNA. The postulated viral DNA polymerase activity seems to depend on a DNA template rather than on an RNA template. The detection of increased DNA polymerase activity in an infected animal which showed no clinical, enzymatic or immunological evidence of hepatitis during the first 70 days after inoculation suggests that the DNA polymerase assay may be useful in screening potentially infective sera.

8008 ACQUISITION OF HEPATITIS B ANTIGEN IN THE NEWBORN PERIOD. *(E.)* Cossart, Y. (Centr. Public Hlth. Lab., London, England). *Postgrad. Med. J.* 50(584):334-337, 1974.

Newborns with mothers who had contracted Australia antigen-positive hepatitis during pregnancy were studied and the incidence of hepatitis was determined. Only 3 infants escaped infection: one whose mother contracted hepatitis early in pregnancy and 2 whose mothers had contracted hepatitis near delivery but who were separated from their mothers after birth. The other 3 babies became antigen positive shortly after birth and have remained long-term carriers. Their liver function tests became abnormal, but they have remained clinically well. Mothers of these infants contracted hepatitis at the time of delivery or shortly thereafter. Liver biopsy of 1 child with antigen-positive serum whose mother had contracted hepatitis at delivery confirmed the presence of hepatitis. In another series of 3 mothers who were Australia antigen carriers, none of the infants was affected. Review of the literature showed that of 28 babies with Australia antigen-positive hepatitis, 80% were born to mothers who had acute antigen-positive hepatitis late in pregnancy or in the puerperium. For over half, the onset coincided with delivery. Neonatal hepatitis, however, seldom occurs in infants whose mothers are carriers or who had hepatitis early in pregnancy.

8009 THE CAUSE AND TREATMENT OF ACUTE LIVER FAILURE. *(E.)* Sherlock, S. (Roy. Free Hosp., London, England). *Rend. Gastroenterol.* 5(3):215-217, 1973.

8010 HEPATITIS B ANTIGEN (HBAg) IN THE REPUBLIC OF IRELAND: DISTRIBUTION OF ad AND ay SUBTYPES. *(E.)* Shattock, A. G.; Gorry, H. F. M. (Dept. Med. Microbiol., Univ. Coll., Dublin, Ireland). *Ir. J. Med. Sci.* 143(4):214-219, 1974.

8011 HEPATITIS ASSOCIATED ANTIGEN AND ANTIBODY IN BLOOD DONORS IN DAR ES SALAAM. *(E.)* Kiango, J. S.; Molbo, I. (Central Pathol. Lab., Dar es Salaam, Tanzania). *East Afr. Med. J.* 51(2):214-216, 1974.

8012 VIRAL HEPATITIS AND SALICYLISM SIMULATING REYE'S SYNDROME. *(E.)* Lyon, L. J.; Nevins, M. A. (Bergen Pines County Hosp., Paramus, N.J.). *J. Med. Soc. N.J.* 71(9):657-660, 1974.

8013 AUSTRALIA ANTIGEN IN THE SERUM OF CHILDREN WITH VIRAL HEPATITIS. *(Pol.)* Oziemska-Lozinska, H.; Dobrzynski, L. (Child. Munic. Hosp., Warsaw, Poland). *Pediatr. Pol.* 48(10):1185-1190, 1973.

8014 STUDIES OF AUSTRALIA ANTIGENEMIA IN CHILDREN AS RELATED TO THE CLINICAL FORM OF VIRUS HEPATITIS. *(Pol.)* Boron, P.; Kossakowski, R.; Sokolewicz, E. (Clin. Infect. Dis., Bialystok, Poland). *Pediatr. Pol.* 48(10):1191-1195, 1973.

8015 THE PRESENCE OF Au ANTIGEN IN THE PROVINCE OF COSENZA: PRELIMINARY FINDINGS. *(It.)* Brancati, C.; Gallo, I. A.; Serra, P. (1st Clin. Infect. Dis., Univ. Rome, Italy). *Ann. Sanita Pubblica* 34(1/2):5-11, 1973.

8016 STUDY OF AUSTRALIA ANTIGEN (HAA-Au/SH) AND AUSTRALIA ANTIBODY DURING AN EPIDEMIC OF VIRAL HEPATITIS. *(It.)* Delia, S.; Scalise, G.; Mura, M. S. (Inst. Infect. Dis., Univ. Sassari, Italy). *Minerva Med.* 65(38/39):2235-2240, 1974.

8017 GLUTAMINE DEHYDROGENASE LEVELS AFTER VIRAL HEPATITIS. *(Pol.)* Maslowski, W.; Czerniakowska, K. (Med. Acad., Warsaw, Poland). *Wiad. Lek.* 26(21):1977-1983, 1974.

8018 CLINICAL VALUE OF SOME PARAMETERS OF WATER-ELECTROLYTE METABOLISM IN VIRAL HEPATITIS IN CHILDREN. *(Rus.)* Novokshonov, A. A.; Uchaikin, V. F. (N. K. Pirogov 2nd Moscow Med. Inst., USSR). *Pediatriia* (5):10-15, 1973.

8019 CHANGES IN NITROGEN METABOLISM AND KIDNEY FUNCTION AS DETERMINED BY ROMEO'S TEST IN CHILDREN WITH VIRAL HEPATITIS. *(Rus.)* Kadyrov, B. A. (Pediatr. Hosp. Infect. Dis. No. 3, Tashkent, USSR). *Pediatriia* (5):16-18, 1973.

8020 CHANGES IN THE ACTIVITY OF LACTATE DEHYDROGENASE AND ITS ISOENZYMES IN THE SERUM OF CHILDREN WITH INFECTIOUS HEPATITIS (BOTKIN'S DISEASE). *(Rus.)* Makhmudov, O. S.; Mukhamedov, D. B. (Tashkent Med. Inst., USSR). *Pediatriia* (5):21-23, 1973.

8021 IMMUNOGLOBULINS IN INFECTIOUS HEPATITIS IN CHILDREN. *(Rus.)* Kupkina, G. K. (Central Inst. Postgrad. Med., Moscow, USSR). *Pediatriia* (3):57-59, 1973.

8022 PLATELET FUNCTION TEST IN LIVER DISEASE. *(Ger.)* Linker, H.; Pfluger, H.; Brinkmann, W.; Reuter, H. (Med. Clin., Univ. Cologne, Germany). *Med. Welt* 24(40):1515-1516, 1973.

See also, 7481, 7686, 7953, 8026.

LIVER AND BILIARY TRACT

Chronic Hepatitis

8023 TOTAL PLASMA BILE ACID CONCENTRATION IN CHRONIC HEPATITIS AND CIRRHOSIS: FASTING VALUES AND EFFECT OF INTRADUODENAL BILE SALT ADMINISTRATION. *(E.)* Franz, B.; Bode, J. C. (Med. Clin., Univ. Marburg, Germany). *Klin. Wochenschr.* 52(11): 522-526, 1974.

Enzymatic determinations of total fasting plasma bile acid concentrations were performed on 35 patients with various forms of cirrhosis, 11 with chronic aggressive hepatitis, 25 with chronic persistent hepatitis, and on 24 controls with no history or clinical evidence of liver disease. Mean values for plasma bile acid concentrations were 40.7 ± 32.5 μM/liter for cirrhotics, 34.2 ± 18.5 μM/liter for patients with chronic aggressive hepatitis, 5.93 ± 4.7 μM/liter for those with chronic persistent hepatitis, and 4.23 ± 2.26 μM/liter for controls. Plasma bile acid concentrations were markedly increased in 80% of the cirrhotics and were above the normal range in all 11 patients with chronic aggressive hepatitis. In contrast, only 25% of the patients with chronic persistent hepatitis had slightly elevated plasma bile acid concentrations. Except for 3 patients with primary biliary cirrhosis who had levels of 80 μM/liter or above, no differences were found between patients with various forms of cirrhosis. No correlation was found between plasma bile acid concentrations and SGOT, SGPT, alkaline phosphatase, serum cholesterol, γ-globulin, decrease in serum albumin concentrations, or the prothrombin time. A positive correlation was observed between plasma bile acid and serum bilirubin concentrations. During a 24-hr period only minor variations occurred in plasma bile acid concentrations in controls, but they increased during the day and returned to fasting values thereafter in 3 of 5 patients with chronic liver disease. Injection of cholecystokinin (1 U/kg i.v.) had little effect on plasma bile acid concentrations in controls but produced significant increases in 4 of 7 patients with chronic liver disease. The failure of cholecystokinin to increase plasma bile acid concentrations in some patients with chronic liver disease is attributed to impaired gallbladder function. Intraduodenal administration of 2 g taurocholate increased plasma bile concentrations in all patients with chronic liver disease but not in controls. The largest increases occurred in patients with the highest fasting plasma bile acid concentrations. No correlation was found between plasma bile acid concentrations and pruritis.

8024 ALPHA$_1$-FETOPROTEIN IN CHRONIC LIVER DISEASE.

(E.) Silver, H. K. B.; Gold, P.; Shuster, J.; Javitt, N. B.; Freedman, S. O.; Finlayson, N. D. C. (Montreal Gen. Hosp., Canada). *N. Engl. J. Med.* 291(10):486-490, 1974.

The production of α_1-fetoprotein and the occurrence of circulating hepatitis B antigen (HBAg) were studied in 171 patients with chronic liver disease whose diagnoses included: chronic HBAg carriers (13), persistent hepatitis (19), chronic active hepatitis (48), primary biliary cirrhosis (13), cryptogenic cirrhosis (28), alcoholic cirrhosis (37), and extrahepatic biliary obstruction (13). Of the total 171 patients, 24 had at least transient elevations of α_1-fetoprotein. Significantly, 16 of the 48 patients (33%) with chronic active hepatitis had elevated serum levels. These 16 patients had more active liver disease as reflected by definitely higher maximum SGOT concentrations, 780 IU/liter, compared with 339 IU/liter for chronic active hepatitis patients negative for α_1-fetoprotein. In addition, the 16 patients positive for α_1-fetoprotein were characterized by seronegativity for HBAg, while the chronic hepatitis patients negative for α_1-fetoprotein were characterized by seropositivity for HBAg. Of the 13 chronic HBAg carriers, only 2 were positive for α_1-fetoprotein. α_1-Fetoprotein levels fell and became undetectable when clinical and laboratory evidence of remission were observed. Of the 123 patients with diseases other than chronic active hepatitis, only 8 had α_1-fetoprotein elevations at any time. None of these 8 patients showed any association between seropositivity for α_1-fetoprotein and the severity of the histologic picture. No correlation was found between the detection of α_1-fetoprotein and the presence of serum autoantibodies, or the activity of the liver disease as reflected by serum transaminase levels in these 8 patients. α_1-Fetoprotein was not detected in any patient with either intrahepatic or extrahepatic biliary obstruction. The correlation of the elevated α_1-fetoprotein and the SGOT levels in 16 chronic active hepatitis patients may reflect a regenerative response on the part of the liver similar to that observed in patients with severe viral hepatitis. Thus, the increased production of α_1-fetoprotein may be associated with the manner of liver injury and the response to that injury rather than with the ultimate severity of the damage. Longitudinal surveillance of appropriate patient populations is needed to determine whether the coexistence of these 2 serologic abnormalities increases the risk of primary hepatoma in patients with chronic liver disease.

8025 TREATMENT OF ACTIVE CHRONIC HEPATITIS AND ACTIVE CIRRHOSIS WITH PENICILLAMINE.

(E.) Schnack, H. (no affil.). *Postgrad. Med. J.* 50(2):44, 1974.

Penicillamine (750 mg/day for 6 months) was used to treat 14 patients with active chronic hepatitis or active cirrhosis who showed high SGOT levels but experienced no jaundice. In a few instances the dose level was raised to 1250 mg/day for short periods. Azathioprine was also administered to 2 patients, 1 of whom received a corticosteroid as well. No improvement was noted in patients with Sjogren's syndrome. Penicillamine was well tolerated and brought about improved biochemical measurements in 8 patients, 4 of whom also showed histological improvement. For various reasons 6 patients did not complete 6 months on penicillamine and gained no benefit from the drug. One of these 6 developed a severe skin reaction at 3 months. No other important adverse reaction was noted. It is suggested that a controlled trial be conducted using penicillamine.

8026 THERAPEUTIC TRIALS WITH HETEROLOGOUS ANTI-Au (SH) GLOBULIN.

(Ger.) Tauchnitz, C.; Rogos, R.; von Baehr, R. (Med. Clin., Karl Marx Univ., Leipzig, Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 33(4/5):173-178, 1973.

Three patients with chronic liver disease (2 with cirrhosis and 1 with chronic active hepatitis) and positive tests for Australian antigen (AuAg) were treated with horse antiserum against AuAg in an attempt to neutralize the circulating antigen. Patients were first tested for allergies to horse serum. The antiserum, used as a 2% IgG solution, was infused i.v. in doses of 10-50 ml in 300 ml electrolyte solution. One of the patients received 50 ml/day antiserum on 3 successive days. No untoward reactions occurred, and the results of liver function tests (SGOT, SGPT, bilirubin, thymol turbidity, and serum alkaline phosphatase) remained essentially unchanged. However, AuAg titers did not decrease. Apparently, there were not enough Au antibodies to neutralize AuAg in these patients. This hypothesis is supported by the lack of change in β_1C-globulin concentrations which were determined before and after therapy in 2 of these 3 patients. It is also possible that circulating antibodies could not reach intracellular antigen.

8027 PROGRESS REPORT. CHRONIC HEPATITIS.

(E.) Sherlock, S. (Roy. Free Hosp., London, England). *Gut* 15(7):581-597, 1974.

8028 CLINICAL EVOLUTION OF HBAg POSITIVE AND NEGATIVE ACTIVE CHRONIC HEPATITIS.

(E.) Naccarato, R.; Farini, R.; Chiaramonte, M.; Sturniolo, G. (Pathol. Med., Univ. Padova, Italy). *Rend. Gastroenterol.* 5(3):229-230, 1973.

8029 AUSTRALIA ANTIGEN, ANTIBODY AND RHEUMATOID FACTOR IN CRYOGLOBULINAEMIC SERA.

(E.) Realdi, G.; Alberti, A.; Rigoli, A.; Tremolada, F. (Clin. Med., Univ. Padova, Italy). *Rend. Gastroenterol.* 5(3):218-219, 1973.

8030 LONG TERM TOXICITY STUDY WITH ALCOHOL AND 4-METHYLPYRAZOLE IN RAT. *(E.)* Kager, L.; Ericsson, J. L. E. (Huddinge Univ. Hosp., Stockholm, Sweden). *Acta Pathol. Microbiol. Scand.* [*A*] 82(4): 534-538, 1974.

8031 CLINICAL ASPECTS OF CHANGES IN BLOOD CLOTTING IN CHRONIC LIVER DISEASES IN CHILDREN. *(Rus.)* Malakhovski, Y. E.; Tsibareva, V. S. (Kemerovo Dist. Clin. Hosp. No. 1, USSR). *Pediatriia* (7):44-50, 1973.

8032 INVESTIGATIONS OF THE CHOLERETIC AND HEPATOPROTECTIVE EFFECT OF MENABIL COMPLEX. *(Rum.)* Gheorghescu, B.; Steflea, D.; Jovin, G.; Suseanu, I. (Gastroenterol. Ctr., Bucharest, Rumania). *Fiziol. Norm. Patol.* 19(1):51-56, 1973.

See also, 7840, 8004, 8022.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

8033 DEATH RATES FROM LIVER CIRRHOSIS IN ALCOHOL MONOPOLY AND FREE-MARKET STATES. *(E.)* Andreano, R. L.; Li, J. Y. (Hlth. Economics Res. Ctr., Univ. Wisconsin, Madison). *Q. J. Stud. Alcohol.* 35(2):649-654, 1974.

At present 17 states restrict sales of alcoholic beverages through state monopolies. In 31 free-market states, retailers and wholesalers are licensed by the state. The adult male cirrhosis death rate/100,000 is 23.2 in the monopoly states and 30.8 in the free-market states. For cirrhosis with alcoholism, the respective rates are 7.5 and 11.3. Analysis based on 4 levels of absolute alcohol consumption shows that death from cirrhosis increases by 8.59/100,000 as alcohol consumption increases from 1.01-2.00 gal/capita to 2.01-3.00 gal/capita. At the 3.01-4.00 gal/capita level, the increase in mortality is 2 times higher than in the previous group. The increase declines at the 4.01-6.94 gal/capita level but is still higher than at the 1st level. A somewhat similar relation obtains for death rates from cirrhosis with alcoholism. Based on these results, a threshold level may exist, perhaps at around 4 gal/capita. Results of regression analysis indicate that a free-market state will have a higher mortality rate from cirrhosis than a monopoly state with an equal alcohol consumption level. The regression coefficients indicate that each gallon reduction in per capita alcohol consumption would produce a predicted mean change in male adult death rates of almost 12.8/100,000 in monopoly states and about 11.9/100,000 in free-market states.

034 PANCREATIC FUNCTION IN MALABSORBING ALCOHOLIC CIRRHOTICS. *(E.)* Moeller, D. D.; Dunn, G. D.; Klotz, A. P. (Univ. Kansas Med. Ctr., Kansas City). *Am. J. Dig. Dis.* 19(9):779-784, 1974.

A 6-month prospective study was performed to determine the frequency of malabsorption in alcoholic cirrhosis. Lundh test meals and pancreozymin-secretin tests were also performed to improve knowledge of pancreatic exocrine function in malabsorbing cirrhotics. Of 31 patients with suspected or proven cirrhosis, 15 had malabsorption. Only 6 of 19 with proven or suspected noncirrhotic alcoholic liver disease (fatty infiltration or alcohol hepatitis or both) had malabsorption. The 6 patients studied (5 men and 1 woman, aged 45-68 yr) were diagnosed as having portal cirrhosis and fatty metamorphosis, liver cell degeneration; septal cirrhosis; portal cirrhosis (3 cases); and cirrhosis of the liver with fecal liver-cell necrosis. Only one of these patients showed significant pancreatic exocrine insufficiency with variations from normal on both the pancreozymin-secretin test and the Lundh test meal. Chymotrypsin concentration plotted against time in the pancreozymin-secretin test showed that the 20-min specimen after the secretin test was significantly lower in cirrhotics. Enzyme concentration in the Lundh test meal showed that cirrhotics had significantly elevated concentrations in the first collection period after the test meal.

8035 LIVER STEATOSIS IN HUMAN PATHOLOGY. *(E.)* Popper, H. (Mt. Sinai Sch. Med., New York, N.Y.). *Rend. Gastroenterol.* 5(3):213-214, 1973.

See also, 7505, 8047.

LIVER AND BILIARY TRACT

Cirrhosis

036 ESSENTIAL L-AMINO ACIDS FOR HYPERALIMENTATION IN PATIENTS WITH DISORDERED NITROGEN ETABOLISM. *(E.)* Abel, R. M.; Abbott, W. M.; Beck, r., C. H.; Ryan, Jr., J. A.; Fischer, J. E. (Massachusetts Gen. Hosp., Boston). *Am. J. Surg.* 128(3): 317-323, 1974.

The effects of hyperalimentation with a solution of hypertonic dextrose and 8 essential L-amino acids were studied in 139 patients with disordered nitrogen metabolism. Most patients (114) had acute renal failure either alone or in combination with acute hepatic failure (hepatorenal syndrome). Patients with chronic hepatic insufficiency without renal failure (7) or with azotemia (18) resulting from a variety of other conditions were also treated. Precautions were taken to avoid electrolyte imbalance during therapy. The most common complication was hyperglycemia (>300 mg%) which occurred at one time or another in 75 (54%) patients. All but 2 were easily treated with a temporary slowing of the infusion rate and/or insulin. Only one case of "hyperosmolar state" occurred. Catheter-related sepsis was documented in 2 patients and was treated by removal of the catheter. One patient developed pneumothorax and one patient with severe coagulopathy died after persistent bleeding from the subclavian venipuncture site. In general, although mortality remained high among the groups of poor-risk patients, hyperalimentation with the essential amino acids and dextrose produced subjective and objective improvement.

8037 THE SIGNIFICANCE OF MALLORY BODIES IN THE PROGRESSION OF FATTY LIVER INTO CIRRHOSIS.

(E.) Christoffersen, P.; Juhl, E. (Kommune Hosp., Copenhagen, Denmark). *Acta Pathol. Microbiol. Scand.* [*A*] 82(4):483-486, 1974.

Two groups of patients with fatty changes of the liver seen on biopsy were studied: 16 patients with Mallory bodies and 67 patients without Mallory bodies. Eleven (69%) of the biopsies with Mallory bodies exhibited changes as seen in alcoholic hepatitis (necrosis of liver cells containing Mallory bodies with infiltration of neutrophils). The incidence of acidophil bodies, parenchymal inflammation, and parenchymal and portal fibrosis was greater in biopsies with Mallory bodies than in biopsies without Mallory bodies. There was no decisive difference in the incidence of lipogranulomas, lytic cell necroses, variation in size of nuclei and cells, portal inflammation, bile duct proliferation, cholestasis, iron content, and lipfuscin or degree of fatty change. Serum asparate-transaminase and BSP-retention were elevated in both groups of patients but were significantly higher in those with Mallory bodies. Repeat biopsies from 14 patients with Mallory bodies showed 3 with cirrhosis and 2 with suspicion of cirrhosis. The observation time for the 3 cases with cirrhosis was 8, 67, and 72 months, resp., and for the cases with suspicion of cirrhosis, 1 and 30 months, resp. Eight patients with Mallory bodies still showed fatty changes and 1 showed portal fibrosis without steatosis. Repeat biopsies from 42 patients without Mallory bodies revealed 2 cases of cirrhosis and 5 of portal fibrosis; most biopsies (35) still showed fatty change. It is concluded that Mallory bodies and alcoholic hepatitis give rise to development of connective tissue in the parenchyma and are a common cause for development of cirrhosis in alcoholics with fatty change of the liver.

8038 THE HEPATIC ARTERY IN CIRRHOSIS: AN ANGIOGRAPHIC PATHOPHYSIOLOGIC CORRELATION.

(E.) Rosenberg, R. F.; Sprayregen, S. (Montefiore Hosp., Bronx, N.Y.). *Angiology* 25(8):499-503, 1974.

The retrograde flow of contrast material to the pancreaticoduodenal, gastroduodenal, hepatic, and splenic arteries was examined in superior mesenteric arteriograms of 50 normal and 37 cirrhotic patients. Of the 50 control subjects, 9 showed no evidence of reflux; 8 showed reflux to the hepatic artery, 17 to the gastroduodenal artery, and 41 to the pancreaticoduodenal arcade. Of the 37 cirrhotic patients, 2 showed no evidence of reflux; 17 showed reflux to the hepatic and 5 to the splenic arteries, 25 to the gastroduodenal artery, and 35 to the pancreaticoduodenal arcade. These data offer angiographic evidence of increased hepatic arterial blood flow in cirrhosis. Pathologic and physiologic evidence of increased hepatic arterial blood supply include increased diameter of the hepatic arteries, increases in the size and number of intrahepatic arteries, and evidence that regenerating lobules of cirrhosis are supplied primarily by arterial blood, as is the connective tissue of the fibrous septa. In cirrhosis the portal vein becomes the major efferent pathway while the hepatic artery supplies most of the blood to the liver. Because of the increased arterial demand on the hepatic artery in cirrhosis, the artery is enlarged and collateral arterial circulation is manifested by the retrograde flow through the pancreaticoduodenal arcade, frequently as far as the hepatic and splenic arteries, on superior mesenteric artery injection. A pronounced accumulation of contrast within the liver parenchyma may be seen, indicating that the hepatic artery has essentially taken over the blood supply to the liver. It is suggested that the increased arterial blood flow contributes to the tortuosity of the intra-hepatic arteries frequently noted in cirrhosis. Celiac stenosis may be due in part to the collateral blood supply; ascites or upward retraction of the liver may accentuate or bring out celiac stenosis. Angiographic evidence corraborating this suggestion is the filling of the splenic artery in 5 of the cirrhotic patients but in none of the controls in the present series.

8039 LYMPHOCYTE TYPES IN PATIENTS WITH LIVER CIRRHOSIS.

(E.) Polli, E.; Maiolo, A. T. (Clin. Med. II, Univ. Milan, Italy). *Rend. Gastroenterol.* 5(3):240, 1973.

8040 OXYHAEMOGLOBIN DISSOCIATION CURVE IN PATIENTS WITH LIVER CIRRHOSIS.

(E.) Gerli, G. C.; Salerno, F.; Stabilini, R.; Fiorelli, G.; Agostoni, A. (Inst. Pathol. Med., Univ. Milan, Italy). *Rend. Gastroenterol.* 5(3):222, 1973.

8041 ALBUMIN METABOLISM IN LIVER CIRRHOSIS.

(E.) Bianchi, R.; Mariani, G.; Pilo, A.; Goni, M. G. (Clin. Med. II, Univ. Pisa, Italy). *Rend. Gastroenterol.* 5(3):219-220, 1973.

8042 METABOLISM OF PENTOBARBITAL IN PATIENTS WITH CIRRHOSIS.

(E.) Denis, P.; Ossenberg, F. W.; Pointard, L.; Benhamou, J. P. (Hosp. Beaujon, Clichy, France). *Digestion* 10(3):215, 1974.

8043 TRIGLYCERIDE METABOLISM IN CIRRHOSIS. *(Cz.)* Skorepa, J.; Mares, P.; Todorovícova, H. (Fac. Gen. Med., Charles Univ., Prague, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 28(5):315-318, 1974.

8044 EFFECT OF A PROTEIN-FREE EXTRACT OF CALF'S BLOOD (ACTIHAEMYL) ON METABOLISM IN THE LIVER, MUSCLES, AND BRAIN OF CIRRHOTICS WITH AND WITHOUT PORTAL ENCEPHALOPATHY. *(Ger.)* Muting, D.; Schieffer, H.; Reikowski, J.; Ecknauer, R. (Prof. Kalk Special Clin. Liver, Digestive, Metabolic Dis., Bad Kissingen, Germany). *Med. Welt* 24(52):2075-2078, 1973.

8045 LACTULOSE IN THE TREATMENT OF CHRONIC PORTOSYSTEMIC ENCEPHALOPATHIES. *(Cz.)* Seidlova, V. (Med. Fac., Purkinje Univ., Olomouc, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 28(3): 201-207, 1974.

8046 EVALUATION OF PORTOSYSTEMIC SHUNT IN CIRRHOSIS BY THE USE OF A NEW RADIOISOTOPE TECHNIQUE. *(Sp.)* Schuller, A.; Jelavic, D.; Garcia de la Fuente, A.; Pozuelo, A.; Valdivieso, L.; Perez Modrego, S.; Lasa, D.; Galvez y Herranz, P. (Francisco Franco Provincial Munic. Sanit., Madrid, Spain). *Rev. Clin. Esp.* 129(6):539-544, 1973.

8047 CLINICAL STUDY OF CIRRHOSIS IN ALCOHOLICS AND NONALCOHOLICS. *(Sp.)* Vasconcellos, D. (Fac. Med., Fed. Univ. Pernambuco, Brazil). *Rev. Esp. Enferm. Apar. Dig.* 43(4):415-426, 1974.

See also, 7688, 7840, 7951, 7953, 7969, 8022, 8023, 8027, 8031, 8033.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

8048 PRIMARY CARCINOMA OF THE GALLBLADDER. *(E.)* Beltz, W. R.; Condon, R. E. (Duke Univ. Med. Ctr., Durham, N.C.). *Ann. Surg.* 180(2):180-184, 1974.

The clinical records of 117 patients (89 women and 28 men, mean age 67 yr) with histologically proven carcinoma of the gallbladder were reviewed. The most frequent preoperative diagnoses were cholelithiasis in early cases and pancreatic carcinoma in more advanced cases. A correct preoperative diagnosis was made in only 11 instances. The majority of atients (71) presented with advanced disease with xtension and metastasis to the liver and to lymph odes along the common bile duct. The mean survival f this group, in whom no attempt was made at palliative or definitive therapy, was 8.5 weeks. In another group of 28 patients, palliative procedures ere performed after initial exploration demonstratd disseminated carcinoma. The mean survival was 5.4 weeks. Four patients had localized disease reognized at operation; 2 were treated with cholecysectomy and 2 with cholecystectomy and hepatic reection. The mean survival of these 4 patients was 4.7 months. There were 14 patients with clinically napparent carcinoma at cholecystectomy; the diagnois was established postoperatively by histologic xamination of the excised gallbladder. Two of the 4 patients survived more than 5 years; both surviors had early papillary carcinoma confined to the allbladder wall. The remaining patients with inpparent carcinoma died within 3 yr of recurrent arcinoma. Extended resection, while not of proven alue, might improve the survival of patients with ocalized carcinomas of the gallbladder. More localized and clinically inapparent carcinomas might e diagnosed if every gallbladder removed from older patients were examined by the surgeon in the operating room prior to completion of the operation.

8049 RECURRENT PYOGENIC CHOLANGITIS IN CHILDREN. *(E.)* Yue, P. C. K. (Dept. Surg., Univ. Hong Kong). *Aust. NZ J. Surg.* 44(1):53-57, 1974.

Recurrent pyogenic cholangitis mainly affects Chinese adults in Hong Kong but was encountered in 6 children (4 boys and 2 girls, aged 7-14 yr) seen over a 20-yr period. While all the children presented with abdominal pain and 5 had fever, jaundice was detected clinically in only 3. All 6 patients had hyperbilirubinemia as well as elevated serum alkaline phosphatase and polymorphonuclear leukocytosis. Only 1 patient showed a slight rise in SGOT and SGPT. The infective enteric bacteria were *Escherichia coli*, *Streptococcus faecalis*, and *Paracolon*. Emergency surgery revealed obstruction of the common bile duct in 5 patients and obstruction of the common hepatic duct in 1; in all cases the obstruction was caused by soft pigment stones. In 1 case, 2 dead ascaris worms were also present. Operative cholangiography was helpful in locating obstructions and residual stones. Surgical procedures included stone removal and T-tube choledochostomy in 3 patients and cholecystectomy plus internal drainage (side-to-side supraduodenal choledochoduodenostomy or transduodenal choledochoduodenostomy) in 3. All patients recovered rapidly and were discharged about 2 weeks later. Two patients required 2nd operations: 1 due to another attack of disease and 1 because of migration of an ascaris worm up the bile duct. In the latter, retrograde cholangiography 3 weeks later showed further migration of ascaris into the hepatic duct. Two other patients have been free from further attacks while 2 have had 1 mild attack of pain and fever, due, resp., to a residual stone in the left intrahepatic duct and a stricture at the confluence of the right and left intrahepatic ducts.

8050 CHOLECYSTOKININ CHOLECYSTOGRAPHY IN THE DIFFERENTIAL DIAGNOSIS OF ACALCULOUS GALLBLADDER DISEASE. *(E.)* Goldstein, F.; Grunt, R.; Margulies, M. (Lankenau Hosp., Philadelphia, Pa.). *Am. J. Dig. Dis.* 19(9):835-849, 1974.

A total of 42 patients with acalculous biliary tract disease were studied by cholecystokinin (CCK) cholecystography over a 13-yr period. Based on their response to CCK, 28 patients were classified as having cystic duct syndrome; 8, sphincter spasm or stenosis; and 6, hypercontraction of the gallbladder. Compared with 17 normal controls, patients with cystic duct syndrome showed marked impairment of gallbladder emptying and minimal, if any, filling of bile ducts. Patients with partial obstruction at the sphincter of Oddi also showed impaired gallbladder emptying; but their common duct became prominent, dye refluxed into hepatic ducts, and no dye entered the duodenum. Sphincter spasm (5 cases) could be differentiated from sphincter stenosis by the response to nitrates and/or anticholinergics. Patients with hypercontraction after CCK showed over 80% emptying of the gallbladder, usually within 5 min. Findings in this group were consistent with diagnosis of hyperplastic cholecystosis. All abnormal CCK responses were associated with reproduction of biliary tract pain. Treatment based on CCK cholecystography was successful for a majority of patients, with follow-up information ranging from 6 months to 11 yr. Attempts to correlate the type of biliary tract motor disturbance with histologic features of resected gallbladders and cystic ducts revealed a substantial overlap, ranging from normal gallbladder and cystic duct histology through varying degrees of chronic cholecystitis and cholecystoses to varying degrees of cystic duct inflammation and fibrosis. The overlapping histological features suggest shared etiologic factors.

8051 CLINICAL EVALUATION OF CHOLEDOCHODUODENOSTOMY. *(Rus.)* Sitenko, V. M.; Nechai, A. I.; Drobot, V. T.; Stukalov, V. V.; Gorkovoi, V. B. (S.M. Kirov Military Med. Acad., Leningrad, USSR). *Vestn. Khir.* 112(1):34-40, 1974.

Enterobiliary anastomoses were evaluated in 136 patients who had undergone choledochoduodenostomy and 4 who had undergone choledochojejunostomy for nonmalignant diseases of the biliary tract. Indications for anastomoses included stenosis of the terminal part of the bile duct (69 cases), suspected choledocholithiasis (51), cysts of the bile ducts (2), insufficiency of the sphincter of Oddi (2), chronic indurative pancreatitis (15), and bits of chitin membrane remaining in the bile ducts after rupture of a hydatid cyst (1). The possibility was investigated that cholangitis may be caused by discharge of duodenum contents into the bile ducts. X-ray examination of the anastomosis in 67 choledochoduodenostomies failed to reveal any signs of cholangitis, but anastomotic stenosis was observed. Of 115 patients with choledochoduodenostomies, 6 had recurrent cholangitis from 6 months to several years after surgery with no subsequent recurrence. Four cases of recurrent cholangitis were not related to anastomotic stenosis. Not a single case had anastomotic stenosis severe enough to cause a complete obstruction. The observations indicate that cholangitis following choledochoduodenostomy is not related to anastomotic stenosis.

8052 BILIARY TRACT EXCRETION OF CEFAZOLIN, CEPHALOTHIN, AND CEPHALORIDINE IN THE PRESENCE OF BILIARY TRACT DISEASE. *(E.)* Ratzan, K. R.; Ruiz, C.; Irvin, III, G. L. (Univ. Miami Sch. Med., Fla.). *Antimicrob. Agents Chemother.* 6(4): 426-431, 1974.

The biliary tract excretion of 3 cephalosporins, cefazolin, cephaloridine, and cephalothin, was compared in patients with biliary tract disease. In 1 group of 15 patients undergoing cholecystectomy for cholelithiasis or a nonfunctioning gallbladder, 1 of the 3 compounds was administered i.m. or i.v. at time of induction of anesthesia. In the absence of obstruction, mean antibiotic levels in bile from gallbladder and common duct were higher for cefazolin (17 and 31 μg/ml, resp.) than for cephaloridine (7 and 9 μg/ml) or cephalothin (1 and 4 μg/ml). Biliary tract levels generally paralleled serum levels. In 3 patients with severe cholelithiasis and/or obstruction of the cystic duct, the cephalosporin level in gallbladder bile was below 1 μg/ml despite common duct levels well above this amount. Eight patients with T-tube drainage were given 1 g of each of the 3 different cephalosporins on separate days. Cephaloridine was administered i.m., cephalothin i.v., and cefazolin both i.v. and i.m. Cefazolin concentrations in bile were many-fold higher than cephaloridine or cepalothin concentrations. Peak cefazolin levels in T-tube bile averaged 51 μg/ml after i.v. and 26 μg/ml after i.m. administration, whereas mean peak levels of cephalothin and cephaloridine were only 6 and 16 μg/ml, resp. T-tube levels reflected serum concentrations and obstruction to biliary flow impaired excretion of each of the drugs in 2 patients. In the absence of obstruction to bile flow, cefazolin is a logical 1st choice for therapy of a biliary tract infection.

8053 EPIDEMIOLOGY AND PATHOGENESIS OF GALLSTONES. *(E.)* Doyle, J. S. (St. Laurence's Hosp., Dublin, Ireland). *Ir. J. Med. Sci.* (Suppl., July): 110-115, 1974.

8054 THE GOOSE THAT LAID THE GOLDEN BILE: GALLSTONE DISSOLUTION IN MAN WITH CHENODEOXYCHOLIC ACID. *(E.)* Dowling, R. H. (Roy. Postgrad. Med. Sch., London, England). *Ir. J. Med. Sci.* (Suppl., July):115-127, 1974.

8055 RESULTS OF 12 YEARS OF GALLSTONE SURGERY IN A CLINIC ORIENTED PRIMARILY TOWARD GERIATRICS: EMPHASIS ON THE NECESSITY FOR EARLY SURGERY. *(Ger.)* Pfitzmann, K. F. (Munic. Clin., Berlin-Buch, Germany). *Z. Alternsforsch.* 27(2):137-144, 1973.

8056 SPONTANEOUS PERFORATION OF THE COMMON BILE DUCT IN ADULTS. *(Ger.)* Fabian, W. (Friedrichshain Munic. Hosp., Berlin, Germany). *Zentralbl. Chir.* 98(35):1247-1253, 1973.

8057 BILIARY TRACT PERFORATION. *(Sp.)* Soleto Saez, E.; Baron Urbano, C.; Lopez-Rios Fernandez, F.; Miguel Velasco, J.; Ruiperez Polo, S.; Parada Herrero, R.; Perez Trinanes, J. (La Paz Munic. Sanit., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 43(4):395-414, 1974.

8058 PRIMARY GALLBLADDER CARCINOMA. *(Ger.)* Shamiyeh, F. (Sisters of Mercy Hosp., Linz, Germany). *Dtsch. Med. Wochenschr.* 99(31):1583-1586, 1974.

8059 MORPHOGENESIS, CLINICAL ASPECTS AND MANAGEMENT IN CHOLECYSTITIS. *(Rus.)* Vinogradov, V. V.; Zima, P. I.; Vasilevskii, A. I. (P. Lumumba Univ., Moscow, USSR). *Vestn. Khir.* 111(12):26-31, 1973.

8060 SELECTION OF SURGERY FOR PATIENTS WITH CHOLECYSTITIS. *(Rus.)* Korolev, B. A.; Popov, S. D. (no affil.). *Vestn. Khir.* 112(3):3-8, 1974.

8061 SURGICAL TREATMENT OF CHOLECYSTITIS. *(Rus.)* Shalaev, M. I.; Petrichenko, A. I.; Duberman, L. B.; Nasonov, Ia. A. (Arkhangelsk Med. Inst., USSR). *Vestn. Khir.* 112(3):8-11, 1974.

8062 ACUTE CHOLECYSTITIS AND CHOLANGITIS DUE TO OPISTHORCHIASIS. *(Rus.)* Ziganshin, R. V.; Tretiakov, A. M.; Lozitskii, I. A. (Tiumen Med. Inst., USSR). *Vestn. Khir.* 112(3):21-25, 1974.

8063 PLASMA PYRIDOXYL COENZYMES IN CHILDREN WITH CHRONIC CHOLECYSTITIS. *(Ukr.)* Krylova, T. V. (L'vov Med. Inst., USSR). *Pediatr. Akush. Ginekol.* 36(2):20-21, 1974.

8064 EXTRAHEPATIC CHOLESTASIS AND ITS LONG-TERM SEQUELAE. *(Pol.)* Kuska, J. (Silesian Acad. Med., Katowice, Poland). *Pol. Arch. Med. Wewn.* 50(9):959-964, 1973.

8065 SURGICAL TREATMENT OF CHOLELITHIASIS. *(Rus.)* Farkas, S.; Gecser, G.; Nyarady, J.; Zadravecz, D. (Med. Inst. Pecs, Hungary). *Vestn. Khir.* 112(3):12-16, 1974.

8066 RESULTS OF SURGERY FOR CHOLELITHIASIS. *(Ger.)* Hottenrott, C.; Ruckert, U. (Surg. Clin., Univ. Heidelberg, Germany). *Zentralbl. Chir.* 98(34):1203-1208, 1973.

8067 CHOLELITHIASIS COMPLICATED BY A CHOLEDOCHODUODENAL FISTULA IN AN INFANT. *(Rus.)* Eremeeva, A. S.; Sorokin, A. F.; Efimov, M. S. (N. F. Filatova Munic. Pediatr. Clin. Hosp. No. 13, Moscow, USSR). *Pediatriia* (4):84-85, 1973.

8068 THE STRUCTURE OF SMALL INTESTINE MUCOSA IN BILIARY DISEASES AND GIARDIASIS OF THE INTESTINE IN CHILDREN. *(Rus.)* Vorozhtosova, N. Ia.; Batanina, G. I. (Kemerovo Med. Inst., USSR). *Pediatriia* (7):37-40, 1973.

8069 BILIARY DISEASE IN CHILDREN. *(Rus.)* Tikhii, A. K.; Archakova, E. V. (Dnepropetrovsk Med. Inst., USSR). *Pediatriia* (7):30-33, 1973.

8070 BILIARY ATRESIA. *(Rus.)* Kusch, N. L.; Tkachenko, N. I.; Timchenko, A. D. (Donetsk Med. Inst., USSR). *Vestn. Khir.* 112(2):82-86, 1974.

8071 CLINICAL SIGNIFICANCE OF RARE ANOMALIES OF THE BILE DUCTS. *(Rus.)* Kurbangaleev, S. M.; Rall, M. B. (I. P. Pavlov 1st Leningrad Med. Inst., USSR). *Vestn. Khir.* 112(3):16-20, 1974.

8072 DUPLICATION OF THE GALLBLADDER. *(Ger.)* Pestessy, J. L.; Bacs, P. (Peterfy Sandor utca Reg. Hosp., Budapest, Hungary). *Zentralbl. Chir.* 98(36):1287-1288, 1973.

8073 LIVER DAMAGE IN GALLBLADDER DISEASES. *(Ger.)* Judmaier, F. (Provincial Hosp., Klagenfurt, Austria). *Zentralbl. Chir.* 98(34):1201-1202, 1973.

See also, 7596, 7597, 7659, 7660, 7663, 7667, 7686, 7689, 7690, 7838, 7958, 7974, 8102, 8134.

GENERAL

8074 CONVERSION OF LONG-CHAIN UNSATURATED FATTY ACIDS TO HYDROXY ACIDS BY HUMAN INTESTINAL BACTERIA. *(E.)* Pearson, J. R.; Wiggins, H. S.; Drasar, B. S. (Central Middlesex Hosp., London, England). *J. Med. Microbiol.* 7(2):265-275, 1974.

Bacteria isolated from the feces of normal human subjects and from patients with high and low fecal hydroxystearic acid levels were screened for their ability to produce hydroxystearic acid from oleic acid, an unsaturated fatty acid. Fatty acid products were identified by several methods including thin-layer and gas-liquid chromatography using purified standards for comparison. Of 104 strains from normal subjects and 103 strains from 20 fecal samples from 15 patients with various gastrointestinal disorders, 94 strains could convert oleic acid to hydroxystearic acid. The most active strain was the enterococci; 98% were converters, most with moderate or high activity. Some active strains were also found among *Bacteroides* (18%), bifidobacteria (32%), clostridia (50%) and enterobacteria (21%). Five of 6 oleic acid-hydrating bacteria studied could also hydroxylate palmitoleic but not linoleic acid. No relation was demonstrated between fecal hydroxystearic acid level and the number of bacteria in the feces able to produce this acid.

8075 CELLULAR IMMUNITY, PERIPHERAL BLOOD LYMPHOCYTE COUNT AND PATHOLOGICAL STAGING OF TUMOURS IN THE GASTROINTESTINAL TRACT. *(E.)* Bone, G.; Lauder, I. (Dept. Surg., Univ. Newcastle upon Tyne, England). *Br. J. Cancer* 30(3):215-221, 1974.

The peripheral blood lymphocyte count was measured in 72 controls and in 74 patients with histologically proven carcinoma of the gastrointestinal tract. The count was correlated with the pathological stage of tumor spread and the patient's delayed hypersensitivity response to 2.4 dinitrochlorobenzene as determined by skin patch testing. A statistically significant correlation was found between the peripheral blood lymphocyte count and the response to 2.4 dinitrochlorobenzene. There was a linear association between the extent of spread of the tumors and the lymphocyte count. Those patients with low peripheral blood lymphocyte counts tended to have more advanced tumors and a poor response to 2.4 dinitrochlorobenzene. Possible causes of this lymphopenia included: 1) increasing tumor mass; 2) thymic atrophy secondary to high circulating corticosteroid levels due to stress; 3) extensive involvement of bone marrow and/or lymph nodes by tumor; 4) release of toxins or free antigen from tumor cells; and 5) migration of sensitized lymphocytes into the neoplasm with attachment to tumor cells.

8076 SEBACEOUS GLANDS IN SALIVARY GLAND TISSUE. *(E.)* Linhartova, A. (Baptist Memorial Hosp., Jacksonville, Fla.). *Arch. Pathol.* 98(5): 320-324, 1974.

8077 THE INVESTIGATION AND MANAGEMENT OF NON-NEOPLASTIC DISEASES AFFECTING THE SALIVARY GLANDS. *(E.)* Diamnat, H. (no affil.). *J. Laryngol. Otol.* 88(8):705-716, 1974.

8078 MYOEPITHELIOMA OF THE PAROTID GLAND. *(E.)* Leifer, C.; Miller, A. S.; Putong, P. B.; Harwick, R. D. (Sch. Dentistry, Temple Univ., Philadelphia, Pa.). *Arch. Pathol.* 98(5):312-319, 1974.

8079 BENIGN PNEUMATOSIS INTESTINALIS IN CHILDHOOD LEUKEMIA. *(E.)* Keats, T. E.; Smith, T. H. (Univ. Virginia Sch. Med., Charlottesville). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 122(1): 1150-1152, 1974.

8080 EVIDENCE OF PARTICLE-ASSOCIATED RNA-DIRECTED DNA POLYMERASE AND HIGH MOLECULAR WEIGHT RNA IN HUMAN GASTROINTESTINAL AND LUNG MALIGNANCIES. *(E.)* Cuatico, W.; Cho, J. R.; Spiegelman, S. (Coll. Physicians Surgeons, Columbia Univ., New York, N.Y.). *Proc. Nat. Acad. Sci.* 71(8):3304-3308, 1974.

8081 A CRIBRIFORM CYLINDROMA WITH METASTASES. *(E.)* Bundi, R. S. (West. Infirm., Glasgow, Scotland). *Br. J. Radiol.* 47(560):506-508, 1974.

8082 MALIGNANT LYMPHOMAS OF THE GASTROINTESTINAL TRACT. *(E.)* Rundles, R. W. (Duke Univ. Med. Ctr., Durham, N.C.). *Cancer* 34(3):948-950, 1974.

8083 PLATELET ADHESIVENESS, PLASMA FREE FATTY ACIDS, AND SERUM TRIGLYCERIDES IN KWASHIORKOR. *(E.)* Khalil, M.; Aref, M. K.; Mahmoud, S.; Abdel Malek, A. T.; Guirgis, F. K.; Moghazy, M.; Abdel Hay, M. M. (Fac. Med., Univ. Alexandria, Egypt). *Arch. Dis. Child.* 49(7):568-570, 1974.

8084 INTESTINAL DISACCHARIDASES IN PRIMARY PROTEIN MALNUTRITION IN ADULTS. *(E.)* Rastogi, M.; Misra, R. C.; Srivastava, P. N.; Sarin, G. S.; Chuttani, H. K. (Maulana Azad Med. Coll., New Delhi, India). *Trop. Geogr. Med.* 26(2):133-136, 1974.

8085 PROTEIN-CALORIE MALNUTRITION IN WEST AFRICAN CHILDREN. *(E.)* Joseph, S. C. (Harvard Sch. Pub. Hlth., Boston, Mass.). *Rocky Mt. Med. J.* 71(7):390-395, 1974.

8086 GASTROINTESTINAL DISEASE IN MALNOURISHED CHILDREN. *(E.)* Gracey, M. (Princess Margaret Children's Med. Res. Fdn., Perth, Australia). *Aust. NZ J. Med.* 4(3):320-321, 1974.

8087 ACUTE DEHYDRATING GASTROENTERITIS IN UNDERNOURISHED INFANTS. THE DIAGNOSIS AND CORRECTION OF ELECTROLYTE AND METABOLIC ABNORMALITIES. *(E.)* Beatty, D. W.; Mann, M. D.; Heese, H. De V.; Berger, G. M. B. (Dept. Pediatr., Univ. Cape Town, South Africa). *S. Afr. Med. J.* 48(37):1563-1569, 1974.

8088 A WATERBORN GASTROENTERITIS EPIDEMIC IN PICO RIVERA, CALIFORNIA. *(E.)* Mahoney, L. E.; Friedmann, C. T. H.; Murray, R. A.; Schulenburg, E. L.; Heidbreder, G. A. (Los Angeles County Hlth. Serv. Dept., Calif.). *Am. J. Public Health* 64(10):963-968, 1974.

8089 GASTROINTESTINAL INFECTIONS IN SINGAPORE—1968 TO 1972. *(E.)* Monteiro, E.; Leong, K. W. (Middleton Hosp., Singapore). *Aust. NZ J. Med.* 4(3):300, 1974.

8090 FIELD TRIALS OF MONOVALENT OGAWA AND INABA CHOLERA VACCINES IN RURAL BANGLADESH—THREE YEARS OF OBSERVATION. *(E.)* Mosley, W. H.; Aziz, K. M. A.; Mizanur Rahman, A. S. M.; Alauddin Chowdhury, A. K. M.; Ahmed, A. (Cholera Res. Lab., Dacca, Bangla Desh). *Bull. WHO* 49(4):381-387, 1973.

8091 A CONTROLLED FIELD TRIAL ON THE EFFECTIVENESS OF THE INTRADERMAL AND SUBCUTANEOUS ADMINISTRATION OF CHOLERA VACCINE IN THE PHILIPPINES. *(E.)* Azurin, J. C.; Cruz, A.; Sumpaico, J.; Dizon, J.; Alvero, M. (Bur. Quarantine, Port Area, Manila, Philippines). *Bull. WHO* 49(4):389-394, 1973.

8092 APPEARANCE OF SPECIFIC COLOSTRUM ANTIBODIES AFTER CLINICAL INFECTION WITH Salmonella typhimurium. *(E.)* Allardyce, R. A.; Sherman, D. J. C.; McClelland, D. B. L.; Marwick, K.; Simpson, A. J.; Laidlaw, R. B. (Roy. Infirm., Edinburgh, Scotland). *Br. Med. J.* 3(3926):307-309, 1974

8093 Yersinia pseudotuberculosis MESENTERIC ADENITIS. *(E.)* Saari, T. N.; Triplett, D. A. (Raymond W. Bliss Army Hosp., Fort Huachuca, Ariz.). *J. Pediatr.* 85(5):656-659, 1974.

8094 EFFICACY OF NEOMYCIN IN THE TREATMENT OF Escherichia coli GASTROENTERITIS. *(E.)* Tan, G. S. G.; Tye, C. Y. (Outram Road Gen. Hosp., Singapore). *Aust. NZ J. Med.* 4(3):300, 1974.

8095 DEFINING THE CLINICAL PROBLEM OF MASSIVE RECTAL BLEEDING. *(E.)* Heald, R. J. (Basingstoke Dist. Hosp., England). *Dis. Colon Rectum* 17(4):432-438, 1974.

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8123 TWO CASES OF COMPLETE ABDOMINAL SITUS INVERSUS ASSOCIATED WITH DEXTROCARDIA. *(Sp.)* Pena Yanez, A.; Raya Munoz, J.; Gil Extremera, B.; Gomez Valverde, E. (no affil.). *Rev. Esp. Enferm. Apar. Dig.* 44(1):85-102, 1974.

See also, 7544, 7665, 7691, 7693, 7728, 7849, 7852.

GENERAL

Parasitology

8124 IMMUNITY TO INTESTINAL TAPEWORMS: THE REJECTION OF Hymenolepis citelli BY MICE. *(E.)* Hopkins, C. A.; Stallard, H. E. (Wellcome Labs. Exp. Parasitol., Univ. Glasgow, Bearsden, Scotland). *Parasitology* 69(1):63-76, 1974.

Hymenolepis citelli cysticeroids were administered by stomach tube to male CFLP mice aged 40-45 days. Beginning the day after infection, some mice were injected 3 times/week for 1 week with cortisone acetate (1 mg, i.m.). Approximately 90% of the cysticercoids became established, equally high recovery rates being obtained after the administration of 1, 3, and 6 worms. In mice infected with 1 worm, the worms increased in weight until day 25-28 postinfection. After a few days at maximum weight (about 24-42 mg), there was a 10-25% decrease in weight, followed by stabilization up through day 90. None of the worms were lost before day 30, after which small losses were observed; only in 2 experiments with older mice (7 weeks) did losses exceed 50% by day 80. In mice infected with 3 worms, 50-80% of the worms were lost between days 17 and 30, while in mice infected with 6 worms, 75% or more of the worms were lost between days 17 and 22. In mice infected with 3 or 6 worms, a residual infection, usually consisting of one worm, persisted in 20-50% of the mice throughout the 63-78-day experiment. In mice infected with 3 or 6 worms, cortisone prevented worm loss, and the worms grew at the same rate as in the single worm infections. The worm burden/mouse remained constant from day 25-55 in the cortisone-treated animals. The results suggest that the immune response apparently elicited by *H. citelli* in the host is a vital factor in regulating the number and longevity of these worms (and probably other tapeworms) in the gut of some natural hosts.

8125 GIARDIASIS IN AMERICAN TRAVELERS TO THE SOVIET UNION. *(E.)* Brodsky, R. E.; Spencer, Jr., H. C.; Schultz, M. G. (Ctr. Dis. Control, Atlanta, Ga.). *J. Infect. Dis.* 130(3):319-323, 1974.

Data collected from questionnaires answered by 1419 American travelers to the Soviet Union since 1969 was analyzed with respect to the incidence of giardiasis. Of these patients, 502 (35.5%) were ill either during their tour or shortly after their return. Stool examinations were reported for 153 patients, with 83 (54%) being positive for cysts of *G. lamblia*. Of all patients studied, 324 had documented giardiasis based on positive stools and/or diarrheal illness lasting for 1 week or longer. There was no correlation between health precautions or dietary restrictions and the incidence of giardiasis. Tap water was considered to be the likely source of infection.

8126 THE SURVEILLANCE OF PARASITIC DISEASES IN THE UNITED STATES. *(E.)* Schultz, M. G. (Ctr. Dis. Control, Atlanta, Ga.). *Am. J. Trop. Med. Hyg.* 23(4):744-751, 1974.

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8129 HUMAN ECHINOCOCCOSIS (HYDTIDOSIS) IN URUGUAY: A COMPARISON OF INDICES OF MORBIDITY AND MORTALITY, 1962-71. *(E.)* Purriel, P.; Schantz, P. M.; Beovide, H.; Mendoze, G. (Honorary Commission Hydatidosis Control, Montevideo, Uruguay). *Bull. WHO* 49(4):395-402, 1973.

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8134 GIARDIASIS AND CHRONIC INFLAMMATORY BILIARY DISEASE IN CHILDREN. *(Ukr.)* Dzys', O. P.; Navrots'ka, H. A.; Omel'chenko, L. I.; Khokhol, I. M. (Kiev Sci. Res. Inst. Pediatr. Obstet. Gynecol., USSR). *Pediatr. Akush. Ginekol.* 36(2):21-22, 1974.

8135 TREATMENT OF PREGNANT WOMEN WITH LISTERIOSIS AND LESIONS OF THE LIVER AND BILIARY TRACT. *(Ukr.)* Fedotova, M. O. (Kiev Res. Inst. Pediatr. O Obstet. Gynecol., USSR). *Pediatr. Akush. Ginekol.* 36(1):44-46, 1974.

8136 BRONCHOBILIARY FISTULA IN HEPATIC ECHINOCOCCOSIS. *(Rus.)* Valiev, F. G. (Bashkir Med. Inst., USSR). *Vestn. Khir.* 112(2):127-128, 1974.

See also, 7816, 7837, 7964, 7965, 7972, 7976, 7977, 7982, 7984, 8047, 8062, 8068.

GENERAL

Regional Enteritis

8137 GRANULOMATOUS ENTEROCOLITIS IN CHILDHOOD AND ADOLESCENCE. *(E.)* Guttman, F. M. (St. Justine Hosp. Children, Montreal, Canada). *J. Pediatr. Surg.* 9(1):115-122, 1974.

Granulomatous enterocolitis was studied in 52 children and adolescents (27 males and 25 females, aged 2.5-27 yr) over periods of 1-24 yr. Granulomatous ileocolitis was present in 12 patients, ileitis and jejunitis in 8, and terminal ileitis in 32. The earliest onset of symptoms began at 2 1/2 yr and 32 subjects experienced onset of symptoms before the age of 15 yr. Abdominal pain was the most frequent symptom (43 cases), followed by fever of unknown origin (27), diarrhea (20), weight loss (14), anorectal inflammation, and failure to grow (6). Of the patients with growth retardation, 3 were left permanently stunted. One child stopped growing at 8 yr but showed no symptoms of Crohn's disease until he was 13 yr old. After surgery, he grew 4 inches; 2 other patients also had growth spurts following operations. Although surgery *per se* did not stimulate growth, it offered a period of respite from the disease to allow for growth, and, in a low but respectable percentage of cases, a long-term abeyance of symptoms. Seventeen of 33 patients on medical management were doing well upon follow-up 1-20 yr after treatment initiation. The rest often had recurrent symptoms for many years and were on therapy intermittently. Of the 19 patients who underwent surgery, 12 had dramatic remissions. Appendectomy after acute illness was followed by remission in only 3 of 15 patients; 7 of these required another operation and 4 others had several hospitalizations with recurrent disease. The recurrence rate after operation was 36.8% while the rate of a 2nd operation was 21%.

8138 SHORT-TERM COURSE AND PROGNOSIS OF CROHN'S DISEASE. *(E.)* de Dombal, F. T.; Burton, I. L.; Clamp, S. E.; Goligher, J. C. (Gen. Infirm., Leeds, England). *Gut* 15(6):435-443, 1974.

Records of 322 patients (161 men and 171 women, aged 9-70+ yr) with Crohn's disease treated over a 30-yr period were analyzed to determine the course and outcome of the initial referred attack. Only 17 of the 322 patients (5.1%) obtained complete remission of symptoms with conservative treatment. In another 75 patients (22.8%), conservative management was partially successful; symptoms persisted but were not incapacitating. In 10 patients (3%), severe symptoms persisted for over 1 yr, and this resulted in reclassification to chronic continuous disease. When patients were grouped according to site of disease, 11.4% of 70 patients with disease restricted to the large intestine achieved full remission on conservative management. This was in contrast to 5.9% of 136 patients with disease confined to the small intestine and 0.9% of 115 patients with diffuse disease affecting both the small and large intestine. Minor surgery was performed on 25 patients with no fatalities, while major surgery on 199 patients resulted in 10 deaths. Including 1 medical death, the overall death rate was 3.3% and this was affected chiefly by the severity of the attack and the age of the patient. The severity of the attack was classified as mild, moderate, or severe depending upon bowel habit, rectal bleeding, abdominal pain, pulse rate, temperature, hemoglobin level, and weight. No deaths occurred in mild attacks while the death rate in severe attacks was 8.8%. While no patient under 20 yr died, the death rate in patients over 60 yr was 14.8%. Comparison with an earlier series of 204 patients with ulcerative colitis showed considerable differences in the course and prognosis of the 2 diseases. In particular, 70% of the patients with ulcerative colitis achieved remission on conservative management, compared with only 5.1% of the patients with Crohn's disease. Moreover, the rate of recourse to radical surgery was far higher in Crohn's disease (56.9%) than in ulcerative colitis (11.3%). Differences in the short term course of these 2 conditions cannot be attributed to the differences in age or extent of the disease.

8139 HYPERALIMENTATION AS PREPARATION FOR SURGERY IN TRANSMURAL COLITIS (CROHN'S DISEASE). *(E.)* Eisenberg, H. W.; Turnbull, Jr., R. B.; Weakley, F. L. (Cleveland Clin. Fdn., Ohio). *Dis. Colon Rectum* 17(4):469-475, 1974.

Forty-six high-risk patients with histologically proven Crohn's disease of the ileum and/or colon received hyperalimentation for periods of 5-46 days prior to or following surgery. All 25 patients who received preoperative hyperalimentation gained weight (average of 0.34 kg/day). There were no deaths, very few postoperative complications, and all but one incision healed promptly. Only 2 of 12 patients who received postoperative hyperalimentation failed to gain weight; both had intra-abdominal sepsis. The most frequent indication for postoperative hyperalimentation was intestinal obstruction. Fistulas in 5 of 18 patients with chronic, draining defects closed spontaneously while the patient was sustained by hyperalimentation. Hyperalimentation also played a crucial role in the management of intestinal obstruction, toxic megacolon, and short bowel syndrome. One patient each developed gram positive sepsis, hemothorax, pancreatitis, and catheter-fragment embolus. Two patients each developed postoperative seizures and hyperosmotic, nonketotic acidosis, and several had hypophosphatemia, usually without symptoms.

8140 ASCORBIC ACID DEFICIENCY AND FISTULA FORMATION IN REGIONAL ENTERITIS. *(E.)* Gerson, C. D.; Fabry, E. M. (Mount Sinai Sch. Med., City Univ. New York, N.Y.). *Gastroenterology* 67(3):428-433, 1974.

Ascorbic acid measured in leukocytes and platelets, and in serum, was significantly decreased in 40 patients with regional enteritis compared to 32 normal subjects. This was related, at least in part, to low intake of ascorbate in patients with regional enteritis. Patients taking supplemental vitamin C had normal leukocyte ascorbic acid, while serum ascorbic acid remained low. Ascorbate concentration was measured in homogenates of ileal tissue obtained at ileal resection performed on 20 ileitis and 8 nonileitis patients, and there was an excellent correlation with leukocyte ascorbic acid. Patients with ileitis and fistulous tracts were noted to have significantly lower ileal and blood ascorbate levels than patients without fistulae. It is suggested that fistula formation in ileitis may be related in part to local ascorbate deficiency.

8141 CROHN'S DISEASE IN HETEROTOPIC GASTRIC MUCOSA IN A MECKEL'S DIVERTICULUM. *(E.)* Bondeson, L.; Starck-Bondeson, A. G. (Malmo Gen. Hosp., Sweden). *Acta Pathol. Microbiol. Scand.* [*A*] 82(3):427-430, 1974.

See also, 7834, 7916.

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GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1978.

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NOTE

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LANGUAGE ABBREVIATIONS

Afr.	Afrikaans
Ar.	Arabic
Bul.	Bulgarian
Ch.	Chinese
Cz.	Czech
Dan.	Danish
Dut.	Dutch
E.	English
Eston.	Estonian
Fin.	Finnish
Fl.	Flemish
Fr.	French
Ger.	German
Gr.	Greek
Heb.	Hebrew
Hun.	Hungarian
Ic.	Icelandic
In.	Indonesian
It.	Italian
Jap.	Japanese
Kor.	Korean
Latv.	Latvian
Lith.	Lithuanian
Nor.	Norwegian
Pol.	Polish
Por.	Portuguese
Rum.	Rumanian
Rus.	Russian
Ser.	Serbo-Croatian
Sl.	Slovak
Sp.	Spanish
Sw.	Swedish
Th.	Thai
Turk.	Turkish
Uk.	Ukrainian
Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocortitropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
ATP	adenosine triphosphate
BSP	sulfobromophthalein
C	degrees centigrade
cm	centimeter(s)
CNS	central nervous system
cpm	counts per minute
DNA	deoxyribonucleic acid
e.g.	for example
g	gram(s)
μg	microgram(s)
hr	hour(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kg	kilogram(s)
LD_{50}	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	mole(s); molar
mEq	milliequivalent(s)
mM	millimole(s); millimolar
μM	micromole(s); micromolar
mC, μC	milli-, microcurie(s)
mg	milligram(s)
min	minute(s)
ml	milliliter(s)
mm	millimeter(s)
MTD	maximum tolerated dose(s)
NAD	nicotanamide adenine dinucleotide
NADH	reduced nicotanamide adenine dinucleotide
NADP	nicotanamide adenine dinucleotide phosphate
NADPH	reduced nicotanamide adenine dinucleotide phosphate
ng	nanogram (10^{-9})
pg	picogram (10^{-12})
p.o.	orally
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

8142 PARATHYROID HORMONE AND GASTRIC MUCOSAL SURFACE ULTRASTRUCTURE. *(E.)* Frenning, B.; Johansson, H.; Ohrn, P. G. (Univ. Hosp., Uppsala, Sweden). *Upsala J. Med. Sci.* 79(2):90-93, 1974.

The gastric mucosal surface of rats given parathyroid hormone (40 USP U/100 g twice a day for 14 days, s.c.) was examined with a scanning electron microscope. Luminal surfaces of surface epithelial cells showed nonspecific damage consisting of mucus-covered microvilli and open crypts. Although the same changes were seen in some control specimens, the changes were more pronounced and the damaged cells more numerous in gastric mucosa from hormone-treated rats. The changes suggest that the decreased gastric secretion observed in rats after parathyroid hormone treatment is an effect of increased back-diffusion of hydrogen ions. The nonspecific damage may be related to the suggested ulcerogenic effect of the hormone.

8143 CHOLINESTERASE-RICH CELLS IN THE RAT FUNDIC MUCOSA. A LIGHT AND ELECTRON MICROSCOPICAL INVESTIGATION. *(E.)* Monga, G.; Bonfanti, S.; Bussolati, G. (Fac. Med. Surg., Univ. Turin, Italy). *Histochem. J.* 6(5):559-565, 1974.

Sections of rat fundic mucosa fixed in formaldehyde or glutaraldehyde-H_2C_2 and incubated in butylcholinesterase medium exhibited staining of numerous pyramidial or elongated epithelial cells in the lower 1/3 of the mucosa. The cells closely corresponded to the argyrophilic cells that stained with the Grimelius method. Electron microscopy showed that the cholinesterase-positive cells were localized in the perinuclear space, the Golgi saccules, throughout the cytoplasm, and occasionally at the plasma membrane of enterochromaffin-like cells. A-like endocrine cells were devoid of specific activity. If the argyrophilic reaction in endocrine cells is related to the presence of lipoproteins in cystoplasmic granules, the cholinesterase activity of enterochromaffin-like cells may be correlated with the argyrophilia of these cells. Cholinesterase activity at the plasma membrane level may relate to the mechanism of hormone release of the regulation of membrane permeability. It is also postulated that cholinesterase activity of enterochromaffin-like cells is correlated with the presence of a cholinergic mechanism of secretion.

8144 A SCANNING ELECTRON MICROSCOPIC STUDY OF NORMAL AND X-IRRADIATED GUINEA-PIG GASTRIC MUCOSA. *(E.)* Capoferro, R. (Rikshosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(6):533-538, 1974.

The scanning electron microscope was used to examine the ultrastructural surface aspects of the normal and of the irradiated gastric mucosa in the guinea pig. Four guinea pigs, weighing about 500 g, were subjected to irradiation of the stomach (dose 1540 R at skin, field size 4.5 X 5.5 cm at skin). Three and 5 weeks later, the animals were fasted for 16-24 hr, and a gastric lavage with isotonic saline was performed. They were then sacrificed and the stomach removed, and samples from different parts of the stomach examined by electron microscopy. The gastric mucosa of 2 non-irradiated control guinea pigs had an ultrastructural topography similar to that reported in other laboratory animals and man, without, however, the typical cobblestone appearance and with less pronounced superficial cell outlines. The mucosal surface of the stomach in the irradiated guinea pigs, however, was markedly irregular with the formation of small sessile polyps, and increased renewal and desquamation of mucus cells. The anomalous patterns of the surface structure may be correlated with similar conditions in human chronic atrophic gastritis.

8145 ULTRASTRUCTURAL CHANGES IN THE SMALL INTESTINES OF RATS WITH SELF-FILLING BLIND LOOPS. *(E.)* Gracey, M.; Papadimitriou, J.; Bower, G. (Princess Margaret Children's Med. Res. Fdn., Perth, Australia). *Gastroenterology* 67(4):646-651, 1974.

Transmission electron microscopy showed extensive damage to microvillous and cytoplasmic portions of enterocytes in specimens of jejunum from Wistar rats with a self-filling blind jejunal loop. The light and scanning electron microscopic appearance of these cells was essentially normal. The ultrastructural changes included variable degrees of distortion and denudation of microvilli, swelling and vesiculation of mitochondria, accumulation of lipid droplets in the apical portions of enterocytes, and distortion of Golgi material. The changes were patchy but occurred in 10-35% of enterocytes examined from the midvillus region of these animals. The results confirm that ultrastructural abnormalities occur in the small intestinal epithelium as a consequence of bacterial contamination of the upper gut. The abnormalities may contribute to intestinal malabsorption in patients with bacterial overgrowth in the upper gut.

8146 MORPHOLOGY AND CELL PROLIFERATION OF SUBEPITHELIAL FIBROBLASTS IN ADULT MOUSE JEJUNUM. I. STRUCTURAL FEATURES. *(E.)* Marsh, M. N.; Trier, J. S. (Harvard Med. Sch., Boston, Mass.). *Gastroenterology* 67(4):622-635, 1974.

The organization and morphology of subepithelial fibroblasts were investigated in adult Charles River mouse jejunum. Toluidine blue-stained 1μ Epon sections of osmium-fixed tissue were compared with electron micrographs of adjacent thin sections permitting precise identification of mesenchymal cells adjacent to crypt and villose epithelium. A continuous subepithelial fibroblast sheath (1-3 cells thick) was observed in the crypts and along the base of some villi. This sheath consisted of fibroblasts which appeared spindle-shaped when sectioned due to thin sheath-like processes which extended toward the periphery from the center of the cells. These cells were closely applied to the epithelial basal lamina and were surrounded by collagen. In contrast, no well-developed sheath was present along the middle and distal portions of the villi. Rather, various mesenchymal cell types (capillary endothelial cells, macrophages, and leukocytes), as well as fibroblasts, were located adjacent to the epithelial lamina. Furthermore, in contrast to the crypt region, collagen was sparse in the lamina of the villi. Thus, an organized subepithelial fibroblast sheath is seen only in the crypt region of mouse jejunum. It is not found throughout the mucosa as in the rabbit and human colon.

8147 STRUCTURE OF RAT LIVER SINUSOIDS AND ASSOCIATED TISSUE SPACES AS REVEALED BY SCANNING ELECTRON MICROSCOPY. *(E.)* Motta, P.; Porter, K. R. (Dept. Anat., Univ. Rome, Italy). *Cell Tissue Res.* 148(1):111-125, 1974.

The inner surface of sinusoids and adjacent hepatocytes from healthy adult albino rats were examined by scanning electron microscopy. The endothelial cells lining the sinusoids showed large numbers of fenestrations that varied greatly in size and arrangement. Some were very small (0.1 μM) and arranged in clusters; other, much larger fenestrae (1.0 μM) were divided by slender strands of cytoplasm. At sites where the large fenestrae were present a double endothelial lining was evident, suggesting a structural assurance against complete breakdown of the thin and fragile endothelial wall. Junctions between adjacent endothelial cells were not found in the preparations. The open continuity of the sinusoid was occasionally interrupted by slender extensions of cells morphologically distinct from the thin fenestrated endothelial cells. These had a characteristically textured surface and were thought to be stellate Kupffer cells. The scanning electron microscope images showed that the subendothelial spaces of Disse are larger than is evident from transmission micrographs. The space, limited on 1 side by hepatocytes with numerous microvilli and on the other by endothelial cells, appears to be only part of an extensive labyrinth of intercellular channels. These connect the more discrete spaces of Disse and extend into the narrow spaces between the hepatocytes. The total effect of this system is to expose the greater part of the liver cell surface to the blood filtrate. Microvilli populate the hepatocyte surfaces except for narrow margins which border the bile canaliculi. Whether their presence coincides with adsorbing surfaces and their absence with secreting surfaces remains to be determined.

8148 ELECTRON MICROSCOPY OF THROMBOCYTES IN THE ORTHOTOPIC PORCINE LIVER HOMOGRAFT DURING THE LATE REJECTION (PHAGOCYTOSIS OF THROMBOCYTES BY KUPFFER CELLS). *(E.)* Cossel, L. (Inst. Pathol, Karl Marx Univ., Leipzig, Germany). *Virchows Arch.* [*Pathol. Anat.*] 304(3):265-273, 1974.

Orthotopic porcine liver homograft was examined by electron microscopy 138 days after transplanation. Thrombocytes were found in sinusoids and at focal interruptions of the endothelial sinusoid lining or at the sinusoid wall, often in the vicinity of normally present endothelial pores. Basement-like structures were visible in the sinusoid wall near the thrombocytes and in the space of Disse between the endothelial lining and the hepatocytes. Apparently unaltered thrombocytes were also observed within Kupffer cells. Although there was an optically empty space between the thrombocyte cell membrane and the surrounding membrane of the Kupffer cell, both membranes were in close contact and appeared to be fused. The phagocytosis of the thrombocytes may represent an increased reaction of the transplant (Kupffer Cells) against host cells (thrombocytes) circulating in the blood. Increased phagocytosis of thrombocytes by Kupffer cells of the transplanted liver might adversely affect the thrombocytopoiesis of the host organism. This would entail blood clotting disturbances and thus impair the long-term prognosis.

8149 ULTRASTRUCTURAL STUDY OF HEPATIC MITOCHONDRIAL ABNORMALITY IN SWINE TREATED WITH CLOFIBRATE. *(E.)* Lee, K. J.; Kim, D. N.; Lee, K. T. (Albany Med. Coll., N.Y.). *Exp. Mol. Pathol.* 20(3): 387-396, 1974.

Hepatic ultrastructural changes associated with the hypocholesterolemic effects of clofibrate were investigated in swine fed a mild atherogenic diet containing 2.4 g cholesterol/day. After 25 days on the diet, serum cholesterol levels rose significantly in all 7 animals and were not lowered by administration of 0.5 g/day clofibrate for 10 days. In contrast, 2 g/day clofibrate for 35 days significantly reduced the mean serum cholesterol level from 308 mg/deciliter to 123 mg/deciliter. Characteristic ultrastructural changes were observed in 17% of hepatocellular mitochondria after 6 weeks of clofibrate treatment. The most frequent mitochondrial alteration was the presence of discrete bundles of tubular or spiral structures which appeared at random in orientation. The number of hepatocellular microbodies increased moderately in clofibrate-treated swine but no structural changes were noted. In some hepatic cells smooth endoplasmic reticulum appeared hyperplastic and rough endoplasmic recticulum slightly dilated.

8150 LIGHT AND ELECTRON MICROSCOPIC STUDIES ON THE DEVELOPMENT OF PERIPORTAL BILE DUCTS OF THE HUMAN EMBRYO. *(E.)* Enzan, H.; Ohkita, T.; Fujita, H.; Iijima, S. (Res. Inst. Nucl. Med. Biol., Hiroshima Univ., Japan). *Acta Pathol. Jap.* 24(4): 427-447, 1974.

To clarify the development of the periportal bile duct in the human embryo, liver tissue from a 13-week-old embryo was examined by light and electron microscopy. A plate-like arrangement of single layered biliary epithelial cells was seen on the surface of periportal liver parenchyma. The space between the plate and adjacent hepatoblasts was small (1-2 μ in diameter). At other periportal sites large biliary spaces (lumens 7-10 μ in diameter) were lined with numerous biliary epithelial cells and a few hepatoblasts. The biliary epithelial cell in these spaces was cuboidal or columnar with a slight apical narrowing at the luminal surface. No intermediate cells between biliary epithelial cells and hepatoblasts were detected in the small or large biliary spaces. The primary bile duct was directly connected with some of the large biliary spaces, and in these areas mitotic figures of the biliary epithelial cells were occasionally found. New bile ducts ran almost parallel to the surface of the liver parenchyma and sometimes contacted the surface of the hepatoblast. It is concluded that the periportal bile duct is formed by the proliferation of the biliary epithelial cells surrounding the biliary space.

8151 THE ANATOMY AND INNERVATION OF THE SPHINCTER OF ODDI IN THE DOG AND CAT. *(E.)* Kyosola, K.; Rechardt, L. (Dept. Anat., Univ. Helsinki, Finland). *Am. J. Anat.* 140(4):497-522, 1974.

The fine three-dimensional structural arrangement of the intrinsic cholinergic innervation system of the sphincter of Oddi was studied in 25 adult cats and 5 adult dogs by microdissection and histological staining techniques and by demonstrating nonspecific cholinesterases in serial sections. The most important morphological features with respect to function were the tapering of the terminal ductus choledochus into a nozzle, the existence of concentric retrograde saccules around the ampulla and intramural part of the bile duct, and the complex construction of the sphincters. This structural arrangement permits an active suction-pressure pumping for evacuation of bile and pancreatic juice and is at the same time effective in preventing regurgitation of the duodenal fluid. If the orificium of the ampulla is obstructed, this structural arrangement probably facilitates regurgitation, especially into the pancreatic duct. The intrinsic cholinergic nervous apparatus of the choledocho-duodenal junction was extremely rich in acetylcholinesterase-positive nerve cells, especially in comparison with the muscular layer of the gut wall, probably indicating the complex motor (and possibly associated sensory) functions of the sphincters in contrast to only slow gross contractions of the gut. The finely graded complex interactions of the various muscle components of the choledocho-duodenal junctions of the dog and cat appeared to be regulated by connecting and integrating neural elements between individual smooth muscle units.

8152 SCANNING ELECTRON MICROSCOPY OF THE ALIMENTARY TRACT. *(E.)* Carr, K. E.; Dunn, J. S.; Toner, P. G. (Dept. Anat., Glasgow Univ., Scotland). *Scott. Med. J.* 19(5):211-220, 1974.

8153 ENDOCRINE CELLS OF THE DOG GASTROINTESTINAL MUCOSA. *(E.)* Kubes, L.; Jirasek, K.; Lamsky, R. (Fac. Med., Charles Univ., Hradec Kralove, Czechoslovakia). *Cytologia* 39(3):179-194, 1974.

8154 CYTODIFFERENTIATION OF THE ACINAR CELLS OF THE RAT SUBMANDIBULAR GLAND. *(E.)* Cutler, L. S.; Chaudhry, A. P. (Univ. Connecticut Health Ctr., Farmington). *Dev. Biol.* 41(1):31-41, 1974.

8155 THE INFLUENCE OF THE AUTONOMIC NERVOUS SYSTEM ON THE ULTRASTRUCTURE OF THE PAROTID ACINAR CELLS. EXPERIMENTAL CONTRIBUTION TO THE NEUROHORMONAL SIALADENOSIS. *(E.)* Donath, K.; Spillner, M.; Seifert, G. (Inst. Pathol., Univ. Hamburg, Germany). *Virchows Arch.* [*Pathol. Anat.*] 364(1): 15-33, 1974.

8156 MORPHOLOGY AND CYTOCHEMISTRY OF RAT SALIVARY GLAND ACINAR SECRETORY GRANULES AND THEIR ALTERATION BY ISOPROTERENOL. I. PAROTID GLAND. *(E.)* Simson, J. A. V.; Spicer, S. S.; Hall, B. J. (Med. Univ. South Carolina, Charleston). *J. Ultrastruct. Res.* 48(3):465-482, 1974.

8157 CONTROL OF CELL PROLIFERATION AND DIFFERENTIATION IN THE NORMAL STOMACH. *(E.)* Willems, G. (St. Pierre Hosp., Brussels, Belgium). *Rend. Gastroenterol.* 5(3):196-203, 1973.

8158 ULTRACYTOCHEMICAL CHARACTERIZATION OF C PARTICLE-PRODUCING VACUOLES IN PANCREATIC ACINAR CELLS OF THE MOUSE. *(E.)* Della Torre, G. (Natl. Inst. Study, Cure Tumor, Milan, Italy). *J. Ultrastruct. Res.* 48(3):388-395, 1974.

8159 GROWTH, MITOSIS, AND MORPHOGENESIS OF THE SIMPLE LIVER ACINUS IN NEONATAL RATS. *(E.)* Le Bouton, A. V. (Coll. Med., Univ. Arizona, Tucson). *Dev. Biol.* 41(1):22-30, 1974.

8160 ULTRASTRUCTURAL LOCALIZATION OF NAD-PYROPHOSPHORYLASE IN THE NUCLEI OF MOUSE LIVER. *(Rus.)* Bukhvalov, I. B.; Unger, E. (Inst. Exper. Clin. Oncol., Moscow, USSR). *Biull. Eksp. Biol. Med.* 77(6):107-110, 1974.

8161 A COMPARATIVE STUDY ON RAT LIVER AND HEPATOMA NUCLEAR MEMBRANES. *(E.)* Harris, J. R.; Price, M. R.; Willison, M. (Bute Med. Bldgs., Fife, Scotland). *J. Ultrastruct. Res.* 48(1):17-32, 1974.

8162 CRYPTOGENIC CELLS AND PROLIFERATIVE CELLS IN INTESTINAL EPITHELIUM. *(E.)* Hendry, J. H.; Potten, C. S. (Christie Hosp., Manchester, England). *Int. J. Radiat. Biol.* 25(6):583-588, 1974.

8163 ON THE FIXATION OF INTESTINAL ABSORPTIVE CELLS. *(E.)* Boom, A.; Daems, W. T.; Luft, J. H. (Lab. Electron Microscopy, Univ. Leiden, Netherlands). *J. Ultrastruct. Res.* 48(3):350-360, 1974.

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

8164 INTESTINAL CRYPT SURVIVAL: A CHEMICAL PROTECTION STUDY. *(E.)* Sigdestad, C. P.; Scott, R. M. (Radiat. Ctr., Univ. Louisville, Ky.). *Radiat. Res.* 59(1):219, 1974.

8165 ELECTRON MICROSCOPE INVESTIGATION OF THE INTERACTION BETWEEN ENTEROTOXIGENIC E. coli AND INTESTINAL EPITHELIUM. *(Rus.)* Polotskii, Iu. E.; Snigirevskaia, E. S.; Dragunskaia, E. M. (Inst. Exp. Med., Leningrad, USSR). *Biull. Eksp. Biol. Med.* 77(6):110-113, 1974.

See also, 8170, 8281, 8742.

ABSORPTION–EXCRETION–TRANSPORT

8166 STUDIES ON THE ATPase ENZYME SYSTEM IN HUMAN INTESTINAL EPITHELIAL CELLS. *(E.)* Mooney, P.; McCarthy, C. F. (Reg. Hosp., Galway, Ireland). *Clin. Chim. Acta* 56(1):37-47, 1974.

Human intestinal epithelial cells were fractionated to yield a soluble and particulate cell fraction, and a brush border fraction. (Na$^+$-K$^+$)-stimulated, ouabain sensitive ATPase was located in the brush border and soluble cell fractions. Mg^{2+}-ATPase occurred throughout the epithelial cell. This enzyme was inhibited by Ca^{2+} in the brush border fraction but was activated by Ca^{2+} and Mg^{2+} in the particulate cell fraction. The (Na$^+$-K$^+$)-ATPase systems were separated and partially purified using Sephadex G-100. The brush border and soluble enzymes have different molecular weights, different K_m values for ATP, and different pH optima. The brush border enzyme is more stable to temperature and to aging, whereas the soluble ATPase, naturally unstable, can be stabilized by the addition of sucrose. These differences indicate that the human intestinal epithelial cells contain 2 distinct types of (Na$^+$-K$^+$)-ATPase. It is suggested that soluble (Na$^+$-K$^+$)-ATPase may function as a mobile carrier in the transport of sugar into the mucosal wall.

8167 THE RESPONSE OF THE SMALL INTESTINE TO VITAMIN D. CORRELATION BETWEEN CALCIUM-BINDING-PROTEIN PRODUCTION AND INCREASED CALCIUM ABSORPTION. *(E.)* Emtage, J. S.; Lawson, D. E. M.; Kodicek, E. (Dunn Nutr. Lab., Cambridge, England). *Biochem. J.* 144(2):339-346, 1974.

Intestinal supernatants from chicks given vitamin D (5 µg intracardially) were examined with a radioimmunological technique capable of estimating calcium-binding-protein concentrations as low as 1 µg/g wet weight. Calcium-binding-protein was not detectable at 8 hr but was present after 12 hr at a concentration of 8.6 µg/g wet weight; in agreement with this an increase in calcium absorption due to vitamin D was detected at 12 hr but not at 8 hr. Synthesis of calcium-binding-protein was also monitored directly by incubating intestinal polyribosomes from vitamin D-treated chicks with ^{125}I-anti-(calcium-binding-protein) and then separating the polyribosomes on sucrose gradients. Calcium-binding-protein was detected on the polyribosomes, as nascent polypeptide chains, as early as 8 hr after vitamin D administration. Further, the binding reaction indicated a near linear increase in the calcium-binding-protein synthesizing capacity over a 16-hr period. From the amount of calcium-binding-protein present 12 and 24 hr after vitamin D administration, production of calcium-binding-protein mRNA was calculated at approximately 1 M/min/intestinal cell. The high correlation between initiation of calcium-binding-protein synthesis and stimulation of calcium absorption by vitamin D emphasizes the importance of calcium-binding-protein in calcium transport.

8168 INFLUENCE OF SODIUM AND PARATHYROID HORMONE ON CALCIUM RELEASE FROM INTESTINAL MUCOSAL CELLS. *(E.)* Birge, S. J.; Switzer, S. C.; Leonard, D. R. (Jewish Hosp. St. Louis, Mo.). *J. Clin. Invest.* 54(3):702-709, 1974.

The influence of sodium and parathyroid hormone on the calcium transport process was investigated in duodenal mucosal epithelium of 3.5-week-old Wistar rats. The procedure permitted the direct measurement of both the rate of uptake and release of ^{45}Ca by mucosal cells. Incubations were carried out with intact intestinal segments, thus preserving the normal structural morphology and cell-to-cell interactions. In terminating the incubation for either uptake or release studies, the mucosal epithelial tissue was removed to the level of the crypt-villus junction and then was rapidly dispersed. The initial rate of uptake characterized a calcium pool with a half-time of saturation of less than 2 min. The entry of ^{45}Ca into this pool was inhibited by sodium cyanide and ethacrynic acid and was stimulated by the removal of chloride ion from the incubation. The initial rate of labeled calcium release was also inhibited by sodium cyanide and removal of sodium ions from the incubation. Parathyroid hormone administration enhanced the release of ^{45}Ca from cells prepared from parathyroidectomized animals. These findings suggest that calcium transport across the brush border and basal-lateral membranes are identifiable components of the kinetics of ^{45}Ca uptake and release from intestinal mucosal cells and that parathyroid hormone stimulates a sodium-dependent mechanism of calcium transport across the basal-lateral membranes.

8169 IDENTIFICATION OF AN INTESTINAL SODIUM AND CALCIUM-DEPENDENT PHOSPHATASE STIMULATED BY PARATHYROID HORMONE.

(E.) Birge, S. J.; Gilbert, H. R. (Jewish Hosp. St Louis, Mo.). *J. Clin. Invest.* 54(3):710-717, 1974.

Basal-lateral membranes were prepared from intestinal homogenates of 3.5-week-old Wistar rats (maintained on a calcium-deficient diet for 3 days and fasted overnight before sacrifice) to identify the enzyme which mediates the parathyroid hormone-sensitive active transport of calcium across the basal-lateral membrane of the intestinal epithelial cell. After parathyroidectomy, animals were given s.c. injections either of parathyroid extract (30 U) or 0.3 ml of 0.2% phenol and 1.6% glycerin in saline 4 hr before sacrifice to evaluate the influence of exogenous parathyroid hormone. An alkaline phosphatase was identified which utilized ATP as a substrate and was dependent on both sodium and calcium ions, with optimum enzyme activity at 200 mM and 0.04 mM, resp. The enzyme's activity decreased with advancing animal age and with removal of the parathyroid glands; this is consistent with a decreased rate of ^{45}Ca release from mucosal cells under the same experimental conditions. Calcium binding to basal-lateral membrane fragments was also sodium dependent and enhanced by the prior administration of parathyroid extract. The consistent correlation between the rate of calcium transport across the basal-lateral membrane of the mucosal cell and the activity of this sodium- and calcium-dependent phosphatase under a variety of experimental conditions suggest that this enzyme may mediate the parathyroid hormone-sensitive active transport of calcium across the intestine.

8170 LIPID ABSORPTION IN NEWBORN YOUNG OF GUINEA PIGS FED A PROTEIN-DEFICIENT DIET DURING GESTATION.

(E.) Zeman, F. J.; Widdowson, E. M. (Dunn Nutr. Lab., Cambridge, England). *Biol. Neonate* 24(5/6):344-353, 1974.

Absorption of ^{14}C-oleic acid (1 mM miscellar solution) and ^{14}C-triolein (60 mM emulsion) administered through duodenal cannula was measured in newborn young of guinea pigs which had been adequately nourished or deprived of protein in the last half of pregnancy. Protein-deficient animals showed significantly greater absorption, transfer, and total uptake of both lipids on the basis of amount/g intestinal tissue/min or amount/g body weight/min. In animals of the deficient group, villi of the jejunum were longer, narrower, and more numerous than in the controls, providing a morphological basis for some of the observed increase.

8171 FATTY ACID UPTAKE AND ESTERIFICATION BY PROXIMAL AND DISTAL INTESTINE IN BILE FISTULA RATS.

(E.) Brand, S. J.; Morgan, R. G. H. (Dept. Physiol., Univ. Western Australia, Nedlands). *Biochim. Biophys. Acta* 369(1):1-7, 1974.

The uptake and reesterification of ^{3}H-oleic acid (1 mM) was studied in intestinal sacs from the duodenojejunum and ileum of control Wistar rats and from rats provided with bile fistulas 48 hr previously. In addition, levels of 2 enzymes involved in the reesterification of absorbed fatty acid, acyl-coenzyme A (CoA):monoglyceride acyl transferase and acyl-CoA synthetase, were measured in proximal and distal intestine from control and bile-diverted animals. Ileal sacs from bile-diverted rats absorbed significantly more fatty acid than ileal sacs from controls (0.481 *versus* 0.382 µM/g weight tissue/15 min) and also reesterified significantly more fatty acid (0.149 *versus* 0.092 µM/g wet weight tissue/15 min). The increased ileal uptake was associated with an increase in the level of acyl-CoA synthetase and a decrease in the level of acyl-CoA:monoglyceride acyl transferase in the distal intestine of rats with bile fistulas compared with controls. These changes in ileal enzyme activity may result from changes in the composition of the lipid mixture absorbed by the distal ileum when bile is diverted. The increased enzyme activity may in turn promote uptake by increasing the rate of handling of absorbed lipid.

8172 A DISTINCT D-FRUCTOSE TRANSPORT SYSTEM IN ISOLATED BRUSH BORDER MEMBRANE.

(E.) Sigrist-Nelson, K.; Hopfer, U. (Biochem. Lab., Eidgenossische Tech. Coll., Zurich, Switzerland). *Biochim. Biophys. Acta* 367(2):247-254, 1974.

The transport of D-fructose was studied in isolated intestinal epithelial brush border membrane of Sprague-Dawley rats. The rate of D-fructose entry was slower than D-glucose but faster than L-glucose or D-mannitol. D-Fructose uptake, measured after 45-sec incubation, was linear up to and saturable above 200 mM, while D-mannitol uptake continued to be linear under identical incubation conditions. Uptake of labeled D-fructose was stimulated in D-fructose-preloaded membranes and unaffected in D-glucose-preloaded membranes. Conversely, D-glucose transport was enhanced in the D-glucose-preloaded membranes and unaltered in the D-fructose-preloaded membranes. D-Glucose uptake was stimulated approximately 3-fold by Na$^+$ and strongly inhibited by phlorizin, whereas neither Na$^+$ nor phlorizin influenced D-fructose uptake. None of the sugars tested (D-mannitol, D-glucose, D-galactose, D-fructose, L-sorbose, or D-tagatose) at 100:1 test inhibitor-to-substrate ratio decreased D-fructose transport. With the same membrane preparations, D-glucose transport was inhibited 75% by D-galactose. The results suggest the existence of a distinct D-fructose transport system, separate from that of D-glucose.

8173 THE ULTRASTRUCTURE AND PERMEABILITY FOR COLLOIDAL CARBON OF INTESTINAL SUBMUCOSAL ARTERIOLES IN RATS.

(E.) Thorball, N.; Olsen, F. (Anat. Dept. C, Univ. Copenhagen, Denmark). *Acta Pathol. Microbiol. Scand.* [*A*] 82(5):627-636, 1974.

The fine structure and the permeability to colloidal carbon of intestinal submucosal arterioles (60-100 µ in diameter) were studied in male Wistar rats. Colloidal carbon particles diluted with distilled water were perfused through a catheter inserted into the common carotid artery; perfusion time was 15-20 min with 30-40 drops/min. The ultrastructure of normal submucosal intestinal arterioles in the rat was qualitatively similar to structure previously described in other organs and other animals. The internal elastic lamina was a fenestrated membrane from 0.1-1.2 μ thick. The fenestrae measured 0.1-1.4 μ, and an average of 1 fenestra was observed/3-4 μ in cross-section of the arteriole. Endothelial protrusions penetrated the elastic lamina corresponding to the fenestrae. In some cases the endothelial protrusions formed myoendothelial junctions. Interendothelial junctions were frequently localized in the endothelial protrusions. The arteriolar wall was not permeable to colloid carbon either as an active transfer or as a passive movement through the endothelium.

8174 HYDROLYSIS AND ABSORPTION OF PROLINE DIPEPTIDES ACROSS THE WALL OF SACS PREPARED FROM EVERTED RAT INTESTINE. *(E.)* Saidel, L. J.; Edelstein, I. (Chicago Med. Sch., Ill.). *Biochim. Biophys. Acta* 367(1):75-80, 1974.

Transfer of intact glycyl-L-proline, L-prolylglycine, L-prolyl-L-proline, L-leucyl-L-proline, L-prolyl-L-hydroxyproline, and *N*-formyl-L-leucine to the interior of sacs prepared from 5-cm segments of everted rat intestine was observed. The amounts varied from 0.24 ± 0.15 μM/30 min for leucylproline to 2.54 ± 0.23 μM/30 min for prolylproline. Of the 2 dipeptides containing glycine and proline, there was significantly more transfer of prolylglycine than of glycylproline. For most of the compounds examined, an inverse relation was found between the intact dipeptide or *N*-formylleucine transferred in 30 min and the total hydrolysis in the same period.

8175 INFLUENCE OF WATER MOVEMENT ON JEJUNAL ABSORPTION IN MAN. *(E.)* Ammon, H. V.; Thomas, P. J.; Phillips, S. F. (Med. Coll. Wisconsin, Milwaukee). *Clin. Res.* 22(4):634A, 1974.

8176 THE EFFECT OF INTRALUMINAL HYDROSTATIC PRESSURE ON INTESTINAL ABSORPTION IN VIVO. *(E.)* Mirkovich, V.; Menge, H.; Robinson, J. W. L. (Cant. Univ. Hosp., Lausanne, Switzerland). *Experientia* 30(8):912-1913, 1974.

8177 CONTINUING GLUCOSE ENHANCED WATER ABSORPTION DURING FLUID SECRETION INDUCED BY GLYCODEOXYCHOLIC ACID (GDC) AND OLEIC ACID (OA) IN MAN. *(E.)* Brown, D. B.; Ammon, H. V. (VA Ctr., Wood, Wisc.). *Clin. Res.* 22(4):601A, 1974.

8178 THE EFFECT OF LANTHANUM ON ION CONTENT AND MOVEMENT IN THE GUINEA-PIG'S TAENIA COLI. *(E.)* Widdicombe, J. H. (Dept. Pharmacol., Univ. Oxford, England). *J. Physiol. (Lond.)* 241(2): 106P-107P, 1974.

8179 EFFECTS OF SYNTHETIC HUMAN GASTRIN I UPON MOVEMENTS OF WATER ELECTROLYTES AND GLUCOSE ACROSS THE HUMAN SMALL INTESTINE. *(E.)* Modigliani, R.; Mary, J. Y.; De Peyer, R.; Bernier, J. J. (St. Lazare Hosp., Paris, France). *Eur. J. Clin. Invest.* 4(5):332, 1974.

8180 EFFECT OF PROSTAGLANDIN E_2 (PGE_2) ON SODIUM AND CHLORIDE TRANSPORT IN RAT JEJUNUM. *(E.)* Declusin, R.; Wall, M.; Whalen, G. (VA Hosp., Milwaukee, Wisc.). *Clin. Res.* 22(4):635A, 1974.

8181 THE SHORT-TERM RESPONSE TO A DRINK OF MILK, LACTOSE OR CASEIN IN CHILDREN WITH APPARENTLY NORMAL GASTROINTESTINAL TRACTS. *(E.)* Rossiter, M. A.; Palmer, T.; Evans, K.; Wharton, B. A. (Queen Elizabeth Hosp. Children, London, England). *Br. J. Nutr.* 32(3):605-613, 1974.

8182 Na^+-INDEPENDENT TRANSPORT OF CALCIUM IN RAT DUODENUM. *(E.)* Wrobel, J.; Michalska, L.; Niemiro, R. (Med. Sch., Gdansk, Poland). *Physiol. Chem. Phys.* 6(3):205-212, 1974.

8183 INHIBITION OF CALCIUM ABSORPTION BY CELLULOSE PHOSPHATE IN MAN. *(E.)* Berstad, A.; Jorgensen, H.; Frey, H.; Vogt, J. H. (Aker Univ. Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(27): 22-23, 1974.

8184 MECHANISM OF THE REDUCED CALCIUM (Ca) TRANSPORT IN THE STREPTOZOTOCIN DIABETIC (D) RAT. *(E.)* Walker, B.; Schedl, H. (Univ. Iowa Coll. Med., Iowa City). *Clin. Res.* 22(4):636A, 1974.

8185 IRON ABSORPTION *(E.)* Worwood, M. (Welsh Natl. Sch. Med., Cardiff). *Br. J. Haematol.* 28(1): 137, 1974.

8186 INTERRELATIONSHIPS OF IRON AND COBALT ABSORPTION: MUCOSAL DISTRIBUTION OF COBALT DURING ABSORPTION. *(E.)* Sheehan, R. G. (VA Hosp., Dallas, Tex.). *Proc. Soc. Exp. Biol. Med.* 146(4): 993-996, 1974.

8187 JEJUNAL ABSORPTION OF HEXOSE IN INFANTS AND ADULTS. *(E.)* Younoszai, M. K. (Coll. Med., Univ. Iowa, Iowa City). *J. Pediatr.* 85(3): 446-448, 1974.

8188 THE ROLE OF Na AS A DETERMINANT OF ASYMMETRIC PERMEABILITY OF RABBIT ILEAL BRUSH-BORDER TO D-GALACTOSE. *(E.)* Holman, G. D.; Naftalin, R. J. (Dept. Physiol., Univ. Leicester, England). *J. Physiol. (Lond.)* 241(2):115P-117P, 1974.

8189 INHIBITION OF FLUID TRANSPORT IN THE ISOLATED GALL BLADDER OF THE GUINEA PIG BY ISOPRENALINE, THEOPHYLLINE AND CYCLIC ADENOSINE 3',5'-MONOPHOSPHATE. *(E.)* Heintze, K.; Petersen, K. U.; Heidenrich, O. (Fac. Med., Rhine-Westphalia Tech. Coll., Aachen, Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 285(2):151-163, 1974.

8190 PROTEIN BINDING BY SPECIFIC RECEPTORS ON HUMAN PLACENTA, MURINE PLACENTA, AND SUCKLING MURINE INTESTINE IN RELATION TO PROTEIN TRANSPORT ACROSS THESE TISSUES. *(E.)* Gitlin, J. D.; Gitlin, D. (Univ. Pittsburgh Sch. Med., Pa.). *J. Clin. Invest.* 54(5):1155-1166, 1974.

8191 ISOLATION OF MICROVILLI FRACTION FROM JEJUNAL MUCOSA AND IN VIVO INCORPORATION OF ^{14}C-LEUCINE INTO MICROVILLI AND TOTAL HOMOGENATE PROTEIN OF SUCKLING RATS. *(E.)* Koldovsky, O.; Jumawan, J.; McNamara, P. D.; Palmieri, M. (Children's Hosp., Philadelphia, Pa.). *Biol. Neonate* 24(3-4): 230-243, 1974.

8192 MECHANISMS OF INCREASED AMINO ACID TRANSPORT IN PREGNANT GUINEA PIG INTESTINE. *(E.)* Butt, J.; Hutcheson, D.; Tumbleson, M. (VA Hosp., Columbia, Mo.). *Clin. Res.* 22(4):635A, 1974.

8193 THE ABSORPTION OF TETRAGASTRIN FROM DIFFERENT SITES IN RATS AND DOGS. *(E.)* Jennewein, H. M.; Waldeck, F.; Konz, W. (Dept. Pharmacol., C. H. Boehringer Sons, Ingelheim/Rhine, Germany). *Arzneim Forsch.* 24(8):1225-1228, 1974.

8194 FACTORS INFLUENCING THE INTESTINAL ABSORPTION OF RADIOSTRONTIUM IN MAN. *(E.)* Spencer, H.; Norris, C.; Bell, G. (VA Hosp., Hines, Ill.). *Radiat. Res.* 59(1):85, 1974.

8195 ON THE ABSORPTION OF POLLEN AND SPORES BY THE INTACT INTESTINAL MUCOUS SURFACE. *(Ger.)* Jorde, W.; Linkens, H. F. (Carmelite Asthma Hosp., Monchengladbach, Germany). *Acta Allergol.* 29(3):165-175, 1974.

8196 DIFFERENTIAL EFFECTS OF CYTOCHALASIN B ON Na AND K TRANSPORT IN A PERFUSED SALIVARY DUCT. *(E.)* Schneyer, L. H. (Univ. Alabama Med. Ctr., Birmingham). *Am. J. Physiol.* 227(3):606-612, 1974.

8197 THE EFFECT OF ATROPINE ON THE ABSORPTION OF LIDOCAINE IN MAN. *(E.)* Adjepon-Yamoah, K. K.; Scott, D. B.; Prescott, L. F. (Roy. Infirm., Edinburgh, Scotland). *Eur. J. Clin. Pharmacol.* 7(5):397-400, 1974.

8198 THE ESCAPE OF ENDOTOXIN FROM THE INTESTINE. *(E.)* Gans, H.; Matsumoto, K. (New York Hosp., Cornell Med. Ctr., N.Y.). *Surg. Gynecol. Obstet.* 139(3):395-402, 1974.

8199 EFFECT OF SOY STEROLS ON INTESTINAL ABSORPTION AND SECRETION OF CHOLESTEROL AND BILE ACIDS IN THE CHICK. *(E.)* Sklan, D.; Budowski, P.; Hurwitz, S. (Fac. Agriculture, Hebrew Univ. Jerusalem, Rehovot, Israel). *J. Nutr.* 104(8):1066-1090, 1974.

8200 PHYSIOLOGICAL FACTORS INFLUENCING FREE FATTY ACID UPTAKE BY THE ISOLATED LIVER *(E.)* Infante, R.; Soler-Argilaga, C.; Renaud, G. (St. Antoine Hosp., Paris, France). *Digestion* 10(3):222-223, 1974.

8201 THE PERMEABILITY TO CARBON OF THE SINUSOIDAL LINING CELLS OF THE EMBRYONIC RAT LIVER AND RAT BONE MARROW. *(E.)* Bankston, P. W.; De Bruyn, P. P. H. (Dept. Anat., Univ. Chicago, Ill). *Am. J. Anat.* 141(2):281-290, 1974.

8202 STUDIES ON THE BILIARY EXCRETION MECHANISMS OF DRUGS. II. BILIARY EXCRETION OF THIAMPHENICOL, CHLORAMPHENICOL AND THEIR GLUCURONIDES IN THE RAT. *(E.)* Uesugi, T.; Ikeda, M.; Kanei, Y.; Hori, R.; Arita, T. (Meiji Coll. Pharm., Tokyo, Japan). *Biochem. Pharmacol.* 23(16):2315-2321, 1974.

8203 BILIARY EXCRETION OF BROMSULPHTHALEIN AND GLUTATHIONE CONJUGATE OF BROMSULPHTHALEIN IN RATS PRETREATED WITH DIETHYL MALEATE. *(E.)* Varga, F.; Fischer, E.; Szily, T. S. (Univ. Med. Sch. Pecs, Hungary). *Biochem. Pharmacol.* 23(18): 2617-2623, 1974.

8204 FURTHER EVIDENCE FOR REABSORPTIVE MECHANISMS IN THE BILIARY SYSTEM OF THE DOG FROM A STUDY OF SEVERAL CHOLERETICS. *(E.)* Rutishauser, S. C. B.; Stone, S. L. (Dept. Physiol., Univ. Coll., Cardiff, Wales). *J. Physiol. (Lond.)* 241(2): 120P-121P, 1974.

8205 PHARMACOLOGICAL PROPERTIES OF GALENIC PREPARATIONS. I. INTESTINAL ABSORPTION OF 1-HYOSCYAMINE IN Scopolia extract. *(Jap.)* Kano, Y.; Konoshima, M. (Fac. Pharm. Sci., Univ. Kyoto, Japan). *J. Pharm. Soc. Jap.* 94(8):898-904, 1974.

8206 PRACTICAL CONCEPTS OF DRUG ABSORPTION, DISTRIBUTION AND LOSS. *(E.)* MacLeod, C.; Rabin, H.; Ogilvie, R.; Ruedy, J.; Caron, M.; Zarowny, D.; Davies, R. O. (Montreal Gen. Hosp., Canada). *Can. Med. Assoc. J.* 111(4):341-346, 1974

8207 EFFECT OF SHORT-CHAIN FATTY ACIDS ON THE INTESTINAL ABSORPTION OF DRUGS IN THE RAT. *(E.)* Inui, K.; Horiguchi, M.; Kimura, T.; Muranishi, S.; Sezaki, H. (Fac. Pharm. Sci., Univ. Kyoto, Japan). *Chem. Pharm. Bull. (Tokyo)* 22(8):1781-1787, 1974.

See also, 8239, 8264, 8329, 8341, 8412, 8545.

8208 DENERVATION POTENTIALS IN THE CANINE ESOPHAGUS. *(E.)*

Pelemans, W.; Van Trappen, G.; Hellemans, J.; Valembois, P.; Janssens, J. (Lab. Gastrointest. Pathophysiol., Univ. Louvain, Belgium). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 613-621.

The electromyographic pattern of the esophagus was studied in 9 dogs which had undergone unilateral medio-cervical vagotomy. Two of these dogs were also studied during thoracotomy. The recordings were compared to control recordings made in denervated gastrocnemius muscle. Before, and for the first 11 days after vagotomy, the esophagus was electrically silent. Activity returned after 12 days and was characterized by short spike potentials (± 2 msec) occurring in a regular rhythm and lasting for at least 5 months. This electromyographic activity was detected over the entire length and circumference of the thoracic and lower cervical esophagus and did not disappear following administration of curare (0.5-10 mg pancuronium bromide, i.v.). A second type of resting activity, characterized by positive sharp waves, was also observed rarely for the first few months following vagotomy but was gradually replaced by polyphasic potentials. Comparison of the experimental and control tracings suggests that unilateral cervical vagotomy produces a typical denervation pattern with fibrillation patterns and positive sharp waves. The appearance of polyphasic potentials later suggests that the esophagus is re-innervated.

8209 THE EFFECT OF VASOPRESSIN ON RESTING GASTROESOPHAGEAL SPHINCTER PRESSURE IN MAN. *(E.)*

Boesby, S.; Pedersen, S. A. (Odense Univ. Hosp., Denmark). *Scand. J. Gastroenterol.* 9(6):587-590, 1974.

The effect of exogenous vasopressin (50 μU/kg/min i.v. for 30 min) on resting lower esophageal sphincter pressure was studied in 13 normal human subjects. Mean sphincter pressure was significantly increased (from 14 mm Hg to 18 mm Hg) whereas mean fundic pressure remained unchanged (6 mm Hg). Following infusion, mean sphincter pressure returned to preinfusion values. These studies indicate that vasopressin is involved in the autoregulation of the gastrointestinal tract. The increase in lower esophageal sphincter pressure following vasopressin infusion is produced by a physiologic vasopressin dose, suggesting that this substance is an important component of both the physiologic and pathophysiologic regulation of the sphincter pressure.

8210 EFFECTS OF INCREASED INTRA-ABDOMINAL PRESSURE ON ESOPHAGEAL PERISTALSIS. *(E.)*

Dodds, W. J.; Hogan, W. J.; Stewart, E. T.; Stef, J. J.; Arndorfer, R. C. (Med. Coll. Wisconsin, Milwaukee). *J. Appl. Physiol.* 37(3):378-383, 1974.

The effect of increased intra-abdominal pressure on esophageal peristaltic function was studied in 18 volunteer subjects (average age 22.9 yr). Intraluminal pressure events were recorded using an infused catheter system and a strain gauge pressure probe. Abdominal compression by a pressure cuff in increments of 25 mm Hg caused 4-5 mm Hg incremental increases in intragastric pressure. Peristalsis was elicited by wet and dry swallows and recorded at abdominal compressions ranging from 0-75 mm Hg. When a bolus was present, graded increases in abdominal pressure caused progressive slowing of the peristaltic wave, increase in peristaltic complex duration, increase in pressure complex amplitude, and prolongation of lower esophageal sphincter relaxation. These changes occurred predominantly in the distal esophagus. Increased intra-abdominal pressure had no effect on peristalsis unaccompanied by an intraluminal bolus (i.e., dry swallow). The mechanism whereby increased intra-abdominal pressure causes quantitative changes in the variables of esophageal peristalsis during bolus transport may be determined by esophageal stretch reflexes, or the contractility characteristics of esophageal muscle, or both.

8211 SYMPATHETIC NERVE ACTIVITY DURING REFLEX SPINAL INHIBITION OF INTESTINAL MOTILITY.

(E.) Kelts, K. A.; Bignall, K. E. (Univ. Colorado Med. Ctr., Denver). *Am. J. Physiol.* 227(3):703-709, 1974.

The relation between mesenteric nerve activity and intestinal motility were examined during the intestinointestinal inhibitory reflex in the chloralose-urethan anesthetized cat. Distension of 1 jejunal loop by cannulation at both ends elicited a reflex inhibition of intestinal motility, recorded as an increase in intraluminal volume in another loop. Simultaneous increases in sympathetic nerve activity to the 2nd loop were detected, averaged, and integrated with a planimeter. Ganglionic blockade and splanchnicotomy abolished tonic efferent mesenteric nerve activity and augmented intestinal contractions, whereas vagotomy had no effect on either parameter. During an intestinointestinal inhibitory reflex, increases in sympathetic nerve activity and decrease in intestinal motility were directly related to the magnitude of the distending pressure and inversely to the prestimulus levels of nerve activity and intestinal tone. The magnitude of intestinal relaxation was directly related to the degree of increase in sympathetic activity. During maintained distension, sympathetic activity gradually decreased and, upon cessation of the stimulus, immediately fell below prestimulus levels. Blood flow in the mesenteric artery did not change significantly during the intestinointestinal inhibitory reflex. Tonic sympathetic inhibitory activity, maintained by mechanisms inherent in the intestinointestinal inhibitory reflex, may function as a constant restraint on intrinsically mediated peristaltic contractions that occur without demonstrable tonic vagal excitation.

8212 ACTION OF 5-HYDROXYTRYPTAMINE ON ELECTRICAL ACTIVITY OF AUERBACH'S PLEXUS IN THE ILEUM OF THE MORPHINE DEPENDENT GUINEA PIG. *(E.)* Takayanagi, I.; Sato, T.; Takagi, T. (Fac. Pharmacent. Sci., Univ. Tokyo, Japan). *Eur. J. Pharmacol.* 27(2):252-254, 1974.

Studies were conducted to determine the effects of 5-hydroxytryptamine (10^{-7}, 3 X 10^{-7} and 10^{-6} gm/ml), nicotine (10^{-6}, 3 X 10^{-6} and 10^{-5} gm/ml) and cerulein (10^{-9}, 3 X 10^{-9} and 10^{-8} gm/ml) on the electrical potential of Auerbach's plexus preparations from the ileum of guinea pigs made dependent on morphine by daily s.c. injections. Spontaneous spike frequencies of Auerbach's plexus from animals sacrificed 30-40 hr after the last dose of morphine ("abstinence syndrome") were faster than, although not significantly different from, those from animals which had received morphine 30 min before sacrifice or those from untreated controls. Random application of 5-hydroxytryptamine, nicotine or cerulein to Auerbach's plexus from control, morphine-treated or abstinence syndrome animals produced a dose-dependent increase in spike frequency. The Auerbach's plexus from guinea pigs with abstinence syndrome was particularly sensitive to 5-hydroxytryptamine, being about 10 times more so than the plexus from treated and control animals. These results suggest that morphine withdrawal excites the 5-hydroxytryptamine M-receptors in Auerbach's plexus and that this excitation accelerates liberation of acetylcholine from the nerves to increase spontaneous movement of the ileum.

8213 THE EFFECT OF STIMULATION ON THE MYOELECTRICAL ACTIVITY OF THE RECTOSIGMOID IN MAN. *(E.)* Taylor, I.; Duthie, H. L.; Smallwood, R.; Brown, B. H.; Linkens, D. (Dept. Surg., Univ. Sheffield, England). *Gut* 15(8):599-607, 1974.

To investigate the myoelectrical activity of the rectosigmoid *in vivo*, 66 subjects were studied at rest and after stimulation with either pentagastrin (6.0 μg/kg/hr i.v.) in 21 cases, neostigmine (0.5 mg i.m.) in 20 cases, or 2 bisacodyl suppositories in 19 cases. Three distinct myoelectrical states were distinguished: 1) a faster electrical rhythm with a frequency of 6-9 cycles/min; 2) a slower rhythm, frequency 2.5-4 cycles/min; and 3) stretches of electrical silence in which no obvious slow wave activity is seen. This state of inactivity predominated above the lower rectum. Of the 2 rhythms, the faster predominated and its incidence was significantly increased by neostigmine at all levels in the rectosigmoid and by bisacodyl in the rectum only. The incidence of the slower rhythm was significantly increased by pentagastrin which had no effect on the faster rhythm. The amplitude of each basic electrical rhythm rose when its incidence was increased. Motor waves were augmented corresponding to which of the 2 electrical rhythms was increased after stimulation.

8214 STUDIES ON THE MECHANICAL ACTIVITY OF THE SECOND PORTION OF THE HUMAN INTESTINE. *(E.)* Habib, F. I.; Corazziari, E.; Delle Fave, G. F.; Melchiorri, P.; Torsoli, A. (Clin. Med. II, Univ. Rome, Italy). *Rend. Gastroenterol.* 5(3):238-239, 1973.

8215 A THEORETICAL ANALYSIS OF SOME MEASURES USED IN STUDIES OF SMALL BOWEL PROPULSION AND THEIR DEPENDENCE ON GASTRIC EVACUATION PATTERNS. *(E.)* Lundqvist, H.; Jung, B.; Nilsson, F. (Dept. Physical Biol., Gustaf Werner Inst., Uppsala, Sweden). *Acta Chir. Scand.* 140(5):410-415, 1974.

8216 PRESSURE STUDIES IN HUMAN DUODENUM RECORDED BY A NEW ELECTRICAL INTRALUMINAL PRESSURE TRANSDUCER. *(E.)* Osnes, M.; Serc-Hansen, F.; Myren, J. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(27):45, 1974.

8217 THE USE OF MINIATURIZED MERCURY STRAIN GAUGES TO RECORD GASTRIC MOTILITY. *(E.)* Kelly, M. A. (Dept. Surg., Queen's Univ., Belfast, Northern Ireland). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 323-329.

8218 APPLICATION OF EXTRALUMINAL FORCE TRANSDUCERS TO MOTILITY. *(E.)* Weisbrodt, N. W. (Univ. Texas Med. Sch., Houston). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 331-335.

8219 INTRACOLONIC PRESSURES DURING PERFUSION IN INTACT MAN. *(E.)* Chauve, A.; Devroede, G.; Bastin, E. (Univ. Hosp. Ctr., Sherbrooke, Canada). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 347.

8220 ELECTRICAL ACTIVITY OF THE CAT SMOOTH MUSCLE ESOPHAGUS: A STUDY OF HYPERPOLARIZING RESPONSES. *(E.)* Diamant, N. E. (Toronto Western Hosp., Canada). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 593-605.

8221 PRESSURE RECORDING ARTIFACTS CAUSED BY RESPIRATORY AND PERISTALTIC MOTION OF THE LOWER ESOPHAGEAL SPHINCTER (LES). *(E.)* Dodds, W. J.; Steward, E. T.; Hogan, W. J.; Stef, J. J.; Arndorfer, R. C. (Med. Coll. Wisconsin, Milwaukee). *Clin. Res.* 22(4):602A, 1974.

8222 INFORMATION FROM PULL-THROUGH INFUSION MANOMETRY ABOUT PRESSURE CONDITIONS IN THE ESOPHAGEAL SPHINCTER. *(Ger.)* Kunath, U.; Schier, G. (Surg. Center, Univ. Frankfurt/Main, Germany). *Dtsch. Med. Wochenschr.* 99(40):1991-1993, 1974.

8223 ESOPHAGEAL MANOMETRY: COMPONENT ANALYSIS OF SYSTEMS USED TO RECORD INTRALUMINAL PRESSURE. *(E.)* Stef, J. J.; Dodds, W. J.; Hogan, W. J.; Linehan, J. H. (Med. Coll. Wisconsin, Milwaukee). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 337-346.

8224 NEURAL CONTROL MECHANISMS IN THE ESOPHAGUS: A CRYPTIC MOTOR INNERVATION. *(E.)* Christensen, J. (Univ. Iowa Coll. Med., Iowa City). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 607-611.

8225 SENSORY INNERVATION OF THE LOWER OESOPHAGUS OF THE CAT. COMPARISON WITH THE OTHER PARTS OF THE DIGESTIVE SYSTEM. *(E.)* Mei, N.; Aubert, M.; Crousillat, J.; Ranieri, F. (CNRS, Marseille, France). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 585-591.

8226 EVIDENCE FOR AN INHIBITORY H_2 RECEPTOR AT THE LOWER ESOPHAGEAL SPHINCTER. *(E.)* Cohen, S.; Snape, Jr., W. J. (Univ. Pennsylvania Hosp., Philadelphia). *Clin. Res.* 22(4):602A, 1974.

8227 THE ADRENERGIC CONTROL OF LOWER ESOPHAGEAL SPHINCTER FUNCTION. *(E.)* DiMarino, A. J.; Cohen, S. (Univ. Pennsylvania Hosp., Philadelphia). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 623-630.

8228 THE ROLE OF A BOLUS IN THE PERISTALTIC CONTRACTION OF THE ESOPHAGUS. *(E.)* Hellemans, J.; Janssens, J.; Vantrappen, G.; Pelemans, W.; Valembois, P. (Lab. Gastrointest. Physiopathol., Univ. Louvain, Belgium). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 573-584.

8229 THE EFFECT OF PROSTAGLANDIN E_1 ON RESTING GASTROESOPHAGEAL SPHINCTER PRESSURE IN NORMAL HUMAN SUBJECTS. *(E.)* Sorensen, H. R.; Boesby, S.; Pedersen, S. A. (Odense Univ. Hosp., Denmark). *Scand. J. Gastroenterol.* 9(27):29, 1974.

8230 ELECTRICAL ACTIVITY OF GASTROINTESTINAL SMOOTH MUSCLE. *(E.)* Duthie, H. L. (Roy. Infirm., Sheffield, England). *Gut* 15(8):669-681, 1974.

8231 INTERDIGESTIVE GASTRIC AND DUODENAL MYOELECTRIC ACTIVITY IN THE UNANESTHETIZED RHESUS MONKEY. *(E.)* Thouin, A.; Braitman, R. E.; Chaddock, T. E.; Hamilton, C. L.; Carlson, G. M. (Univ. Pennsylvania, Sch. Med., Philadelphia). *Physiologist* 17(3):345, 1974.

8232 INTERPRETATION OF FLUCTUATION OF TRANSMURAL POTENTIAL DIFFERENCE ACCROSS THE PROXIMAL SMALL INTESTINE. *(E.)* Wingate, D.; Green, R.; Symes, J.; Pilot, M. (London Hosp. Med. Coll., England). *Gut* 15(7):515-520, 1974.

8233 DISCHARGE PATTERNS OF SINGLE ENTERIC NEURONS OF THE SMALL INTESTINE OF THE CAT, DOG AND GUINEA PIG. *(E.)* Wood, J. D.; Mayer, C. J. (Univ. Kansas Med. Ctr., Kansas City). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 387-408.

8234 INTESTINAL MECHANORECEPTOR REFLEX EFFECTS ON SYMPATHETIC NERVE ACTIVITY TO INTESTINE AND KIDNEY. *(E.)* Ninomiya, I.; Irisawa, H.; Woolley, G. (Sch. Med., Hiroshima Univ., Japan). *Am. J. Physiol.* 227(3):684-691, 1974.

8235 THE GASTROINTESTINAL INTERDIGESTIVE HOUSEKEEPER: MOTOR CORRELATES OF THE INTERDIGESTIVE MYOELECTRIC COMPLEX OF THE DOG. *(E.)* Code, C. F.; Schlegel, J. F. (Mayo Clin., Rochester, Minn.). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 631-634.

8236 ELECTRICAL ACTIVITY OF THE GASTRO-INTESTINAL TRACT IN DOG DURING VOMITING. *(E.)* Monges, H.; Salducci, J.; Naudy, B. (Nord Hosp. Marseilles, France). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 480-488.

8237 ACTIONS AND INTERACTIONS OF SECRETIN AND PENTAGASTRIN UPON GASTRIC MYOELECTRICAL ACTIVITY IN PIGS. *(E.)* Roze, C.; Couturier, D.; Lagneau, P.; Gilles, M. R.; Debray, C. (Bichat Hosp., Paris, France). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 489-503.

8238 EFFECTS OF PENTAGASTRIN ON GASTRIC MOTILITY: ELECTROMIOGRAPHIC [SIC!] STUDY IN THE FASTED AND FED PIG. *(E.)* Roze, C.; Couturier, D.; Chariot, J.; Lagneau, P.; Gilles, M. R.; Debray, C. (Bichat Hosp., Paris, France). *Digestion* 10(3):241, 1974.

8239 BILE SECRETION AND THE BIOELECTRIC ACTIVITY OF THE DIGESTIVE TRACT. *(Rus.)* Klimov, P. K.; Kotelnikova, V. I.; Ustinov, V. N. (I.P. Pavlov Inst. Physiol., Leningrad, USSR). *Fiziol. Zh. SSSR* 60(8):1249-1260, 1974.

8240 CHANGES OF GASTROINTESTINAL MOTILITY EVOKED BY SPINAL CORD COOLING AND HEATING. *(E.)* Tsuchiya, K.; Kozawa, E.; Iriki, M.; Manchanda, S. K. (Tokyo Metropolitan Inst. Gerontol., Japan). *Pfluegers Arch.* 351(4):275-286, 1974.

8241 EFFECT OF PARASYMPATHETIC DENERVATION OF THE STOMACH, DUODENUM, AND JEJUNUM ON THEIR MOTOR RESPONSE TO INSULIN HYPOGLYCEMIA. *(Rus.)* Bogach, P. G; Groisman, S. D.; Nga, C. Z. (Inst. Physiol., T. G. Shevchenko State Univ., Kiev, USSR). *Fiziol. Zh. SSSR* 60(9):1446-1453, 1974.

8242 CONTROL OF GASTRIC RECEPTIVE RELAXATION BEFORE AND AFTER VAGOTOMY. *(E.)* **Abrahamsson, H.; Jahnberg, T.; Jansson, G.; Martinsson, J.** (Dept. Physiol., Univ. Goteborg, Sweden). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 547-554.

8243 STUDIES OF GASTROINTESTINAL INTERACTIONS. *(E.)* Johansson, C. (Karolinska Inst., Stockholm, Sweden). *Scand. J. Gastroenterol.* [*Suppl.*] 9(28):1-60, 1974.

8244 TRANSIT IN THE SMALL AND LARGE INTESTINE. *(E.)* Phillips, S. F. (Mayo Clin., Rochester, Minn.). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 471-477.

8245 INTESTINAL MARKERS. *(E.)* Smith, C. L. (Univ. Cincinnati Med. Ctr., Ohio). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 353-354.

8246 ACCELERATED TRANSIT OF INTESTINAL GAS WITH SIMETHICONE. *(E.)* Danhof, I. E.; Stavola, J. J. (Univ. Texas Southwest. Med. Sch., Dallas). *Obstet. Gynecol.* 44(1):148-154, 1974.

8247 THE EFFECT OF DIETARY FIBRE ON TRANSIT TIME. *(E.)* Connell, A. M.; Smith, C. L. (Univ. Cincinnati Med. Ctr., Ohio). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 365-368.

8248 GASTRIC EMPTYING AND SECRETION: KINETIC ANALYSIS AND PHYSIOLOGICAL MODEL. *(E.)* Dubois, A.; Berman, M. (Natl. Inst. Mental Health, Bethesda, Md.). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 523-536.

8249 GASTRIC EMPTYING OF A NUTRITIONALLY BALANCED LIQUID DIET IN THE RHESUS MONKEY. *(E.)* Chaddock, T. E.; Carlson, G. M.; Hamilton, C. L. (VA Hosp., Philadelphia, Pa.). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 515-522.

8250 ANTRAL AND DUODENAL MOTOR ACTIVITY AND GASTRIC EMPTYING WITH SECRETIN AND PENTAGASTRIN. *(E.)* Cooke, A. R.; Kottemann, W. J. (VA Hosp., Iowa City, Iowa). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 537-545.

8251 INTERFERENCE OF FAT AND FLUORIDE ON GASTRIC EMPTYING OF RATS. *(E.)* McGown, E. L.; Suttie, J. W. (Coll. Agric., Univ. Wisconsin, Madison). *Fluoride Q. Rep.* 7(4):225-226, 1974.

8252 MODIFICATION OF THE MECHANICAL RESPONSE OF THE SMOOTH MUSCLES OF PREGNANT MOUSE MYOMETRIUM AND GUINEA PIG ILEUM BY CADMIUM AND MANGANESE IONS. *(E.)* Osa, T. (Fac. Dent., Kyushu Univ., Fukuoka, Japan). *Jap. J. Physiol.* 24(1):101-117, 1974.

8253 MOTOR EFFECTS OF BOMBESIN ON GALL BLADDER, DUODENUM AND JEJUNUM IN MAN. *(E.)* Corazziari, E.; Delle Fave, G. F.; Habib, F. I.; Melchiorri, P.; Improta, G.; Anzini, F.; Torsoli, A. (Med. Clin. II, Univ. Rome, Italy). *Rend. Gastroenterol.* 5(3):239, 1973.

8254 POSTOPERATIVE BILIARY MANOMETRY AT VARIOUS RATES OF INTRACHOLEDOCHAL INFUSION WITH OR WITHOUT ADMINISTRATION OF MORPHINE. *(Fr.)* Bonfils, S.; Gislon, J.; Galmiche, J. P. (Bichat Hosp., Paris, France). *Biol. Gastroenterol. (Paris)* 7(2):117-129, 1974.

8255 EFFECTS OF LANTHANUM AND CALCIUM ANTAGONISTS ON CONTRACTILE RESPONSES OF ISOLATED GUINEA-PIG GALLBLADDER. *(E.)* Andersson, K. E.; Hedner, P.; Persson, C. G. A. (Dept. Pharmacol., Univ. Lund, Sweden). *Acta Physiol. Scand.* 91(3):16A-17A, 1974.

See also, 8176, 8197, 8274, 8485, 8531, 8614, 8874, 8875.

SECRETION AND METABOLISM

8256 LINGUAL LIPASE. *(E.)* Hamosh, M.; Scow, R. O. (Natl. Inst. Arthritis, Metab., Dig. Dis., Bethesda, Md.). *4th Symp. Oral Secretion Perception. Development in the Fetus and Infant.* pp. 311-320, 1973.

Lipolytic activity in tissue homogenates, saliva and gastric contents was measured in tissue from adult female and 3-6 day old suckling rats. A high lipolytic activity was found in the serous glands of the tongue. The enzyme hydrolyzed triglyceride to mostly diglyceride and free fatty acids at a pH of 4.5-5.5. The activity was present in the tongue 2 days before birth and increased markedly after birth. The anterior oral pharyngeal wall, lateral oral pharyngeal wall, and soft palate also contained lipolytic activity but at a much lower level. Lipolytic activity was found in saliva collected through an esophageal cannula and in stomach contents of rats fed a fat-rich meal, as well as in the stomach contents of suckling rats. There was very little activity in the stomach, however, when saliva was excluded. Lipolytic activity was not present in gastric mucosa or in the large salivary glands. The findings suggest that the serous glands of the tongue secrete a potent lipase which acts in the stomach to hydrolyze dietary triglyceride to partial glycerides and free fatty acids. It is proposed that this reaction is the 1st step in the digestion of dietary lipid.

8257 RELEASE OF KALLIKREIN FROM ISOLATED CELLULAR ORGANELLES OF THE RAT SUBMANDIBULAR SALIVARY GLAND. *(E.)* Gautvik, K. M.; Kriz, M. (Inst. Physiol., Univ. Oslo, Norway). *Acta Physiol. Scand.* 92(1):95-102, 1974.

8258 THE EFFECT OF CATECHOLAMINE ANALOGUES UPON AMYLASE SECRETION FROM THE MOUSE PAROTID GLAND IN VIVO: RELATIONSHIP TO CHANGES IN CYCLIC AMP AND CYCLIC GMP LEVELS. *(E.)* Durham, J. P.; Butcher, F. R. (Dept. Biochem., Univ. Glasgow, Scotland). *FEBS Lett.* 47(2):218-221, 1974.

8259 TESTOSTERONE-INDUCED ACCUMULATION OF EPIDERMAL GROWTH FACTOR IN THE SUBMANDIBULAR SALIVARY GLANDS OF MICE, ASSESSED BY RADIOIMMUNOASSAY. *(E.)* Roberts, M. L. (Dept. Dent. Med. Surg., Univ. Melbourne, Parkville, Australia). *Biochem. Pharmacol.* 23(23):3305-3308, 1974.

8260 STEROID BALANCE AND TISSUE CHOLESTEROL ACCUMULATION IN GERMFREE AND CONVENTIONAL RATS FED DIETS CONTAINING SATURATED AND POLYUNSATURATED FATS. *(E.)* Kellogg, T. F. (Dept. Biochem., Mississippi State Univ., Mississippi State). *J. Lipid Res.* 15(6):574-579, 1974.

8261 A COMPARATIVE STUDY OF XENOBIOTIC-METABOLIZING ENZYMES IN LIVER AND INTESTINE OF VARIOUS ANIMAL SPECIES. *(E.)* Chhabra, R. S.; Pohl, R. J.; Fouts, J. R. (Natl. Inst. Environ. Health Sci., Research Triangle Park, N.C.). *Drug. Metab. Disposit.* 2(5):443-447, 1974.

8262 THE DAILY RHYTHM OF SALIVARY ELECTROLYTES IN MANUAL LABORERS ON WORKDAYS AND VACATION DAYS. *(Rus.)* Opalovskaia, G. M. (Inst. Cytol. Genet., Novosibirsk, USSR). *Gig. Tr. Prof. Zabol.* (8):47-49, 1974.

8263 Ca^{2+}-ATPase ACTIVITY IN ISOLATED SECRETORY GRANULE MEMBRANES. *(E.)* Watson, E. L.; Siegel, I. A.; Robinovitch, M. R. (Center Res. Oral Biol., Univ. Washington, Seattle). *Experientia* 30(8):876-877, 1974.

8264 LIBERATION OF ACETYLCHOLINE BY OUABAIN IN THE CAT SUBMANDIBULAR GLAND. *(E.)* Poulsen, J. H. (Inst. Med. Physiol. A, Univ. Copenhagen, Denmark). *Pfluegers Arch.* 350(3):281-286, 1974.

See also, 8154, 8155, 8156, 8280.

SECRETION AND METABOLISM

Stomach

8265 GASTRIC ACID SECRETION IN CONSCIOUS MINIATURE PIGS. *(E.)* Moeller, H.; Sewing, K. F.; Geisbe, H.; Schmolke, M. (Pharmacol. Inst., Univ. Tubingen, Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 283(1):83-92, 1974.

Gastric acid secretion was studied in 5 miniature female pigs surgically provided with a chronic gastric fistula 5 weeks earlier. Basal secretion did not change significantly with age. Histamine (3.9-500 μg/kg), carbachol (1.6-200 μg/kg) or pentagastrin (0.25-32 μg/kg) produced a dose-dependent secretion volume and acid response with the highest peak acid output being achieved by histamine (30.1 ± 2.2 mEq H^+/hr). Maximal peak volume output following histamine was exceeded only by that following carbachol administration, the latter being due to excessive salivation.

8266 THE ACID-BASE BALANCE IN GASTRIC H^+ SECRETION. *(E.)* Russell, J. C.; Kowalewski, K. (Surg. Med. Res. Inst., Univ. Alberta, Edmonton, Canada). *Physiol. Chem. Phys.* 6(3):269-274, 1974.

The relations between the rate of hydrogen ion secretion and base excess in the blood, and between total carbon dioxide change and oxygen consumption were investigated in the canine stomach. *Ex vivo* stomachs from 24 dogs, isolated and perfused with homologous blood, were used for 234 thirty-min observations of the hydrogen ion secretion and corresponding blood acid-base oxygen status. The hydrogen ion secretion rate was found to be offset fairly precisely by arteriovenous increase in the base excess. The total carbon dioxide content of the venous blood was found to exceed that of the arterial blood by an amount much greater than the metabolic contribution through oxygen consumption. The data were fitted by the regression equation:

Δ_{total} CO_2 (mEq/min) = $-0.235 + 1.61 \times \Delta O_2$ (mM/min). The results indicate that the resting canine stomach removes carbon dioxide from the blood stream and subsequently releases it as a buffering agent during active hydrogen ion secretion.

8267 ANTRAL ACIDIFICATION AND THE GASTRIC SECRETORY RESPONSE TO PENTAGASTRIN AND ACETYLCHOLINE IN DOGS. *(E.)* Wheeler, M. H.; Prescott, R. J.; Forrest, A. P. M. (Dept. Clin. Surg., Univ. Edinburgh, Scotland). *Br. J. Surg.* 61(8):605-610, 1974.

In 6 dogs with innervated antral pouches (3 with vagally innervated fundic pouches and 3 with vagally denervated fundic pouches) gastric secretion was stimulated by submaximal doses of pentagastrin (0.125 to 1.0 μg/kg), each infused i.v. for a period of 6 hr. During the 3 consecutive 2-hr collection periods of each test the antral pouch was perfused with isotonic saline of pH 7.0, 1.0, and 7.0, resp., at 1 ml/min. Neither acid nor pepsin secretion was inhibited by antral acidification. When the antral perfusion rate was increased to 3 ml/min there was still no inhibition of acid secretion from either type of fundic pouch. In each dog the acid response of the fundic pouch to perfusion of the innervated antral pouch with 0.5% acetylcholine was significantly reduced when the pH of the perfusate was lowered from 7.0 to 1.0. The results provide no support for the existence of either an antral inhibitory hormone or inhibitory neural reflex active against pentagastrin-stimulated gastric secretion in the dog. It would seem that antral inhibition of gastric secretion is the result of a diminished release or formation of endogenous gastrin.

8268 THE ROLE OF VAGAL INNERVATION IN GASTRIC AND PANCREATIC RESPONSES TO MEALS VARYING IN pH. *(E.)* Dembinski, A.; Konturek, S. J.; Thor, P. (Med. Acad., Krakow, Poland). *J. Physiol. (Lond.)* 241(3):677-688, 1974.

In 3 dogs surgically provided with chronic gastric and pancreatic fistulas, gastric acid response to a 10% peptone meal was measured by a method of intragastric titration at pre-selected pH values from 6.0 to 2.0 or at a constant pH during i.v. infusion of secretin in graded doses from 0.25 to 4.0 U/kg/hr. Simultaneously, pancreatic secretion was determined by the standard collection technique and serum gastrin response was measured by radioimmunoassay. In this way the pH profile for the inhibition of gastric response and stimulation of pancreatic secretion as well as serum gastrin response to a peptone meal were determined and compared with that obtained with exogenous secretin or feeding a liver meal. Truncal vagotomy resulted in a significant 35% decrease of gastric acid response to the meal at all pH levels or at all doses of secretin, but the inhibitory effect of gastric acidification or secretin on serum gastrin and gastric acid response to a meal remained unchanged. Vagotomy caused a significant decrease in both pancreatic bicarbonate (40%) and protein (25%) output in response to meals at all pH levels and at all doses of secretin except the largest one. Pancreatic secretion stimulated by secretin alone was not affected by vagotomy, whereas that induced by feeding a liver meal was markedly decreased by this procedure. From these studies it was tentatively concluded that the vagus nerve facilitates the release of intestinal hormones and that vagotomy causes a decrease of gastric and pancreatic responses to endogenous but not to exogenous stimuli.

8269 GASTRIC SECRETORY RESPONSE TO ACUTE ISOTONIC HYPERVOLEMIA. *(E.)* Kraft, A. R.; Coran, A. G.; Homer, L. D.; Herman, C. M. (Natl. Naval Med. Ctr., Bethesda, Md.). *Am. J. Surg.* 128(5):624-627, 1974.

The effects of acute isotonic extracellular fluid volume expansion were studied in conditioned, anesthetized dogs who underwent pyloric ligation and creation of an external gastric fistula. A hypervolemic state was produced with i.v. Ringer's lactate solution (total fluid input of about 4 liters). The canine stomach responded as a "third-kidney" by significantly increasing gastric juice volume (528%) and gastric acid output (696%). This occurred paradoxically in the presence of a lactate load and a metabolic alkalosis. Vital signs and central venous pressure remained stable. Urinary output increased about 25-fold while the hematocrit fell by 20%. Thus, although the stomach may respond as a "third kidney" to isotonic hypervolemia, it apparently does so at the expense of acid-base homeostasis.

8270 EFFECT OF GLUCAGON ON PENTAGASTRIN-INDUCED GASTRIC SECRETION OF SODIUM, POTASSIUM AND CALCIUM IN MAN. *(E.)* Christiansen, J.; Hendel, L. (Glostrup Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(5):437-440, 1974.

The effect of glucagon on gastric secretion of sodium, potassium, and calcium was studied in 7 healthy individuals. Glucagon (20 μg/kg/hr) was administered as a continuous i.v. infusion on a background infusion of pentagastrin (1 μg/kg/hr). Secretory volume was decreased 42% during combined glucagon-pentagastrin infusion compared to infusion of pentagastrin alone. Gastric acid secretion followed a similar pattern, being inhibited 45% during combined infusion. Sodium output was reduced by 31%, but the ratio Na concentration/secretory rate increased by 26%, indicating a relative increase in sodium output. Potassium secretion was inhibited by 57%. Calcium concentration increased slightly (13%), and output was inhibited to the same degree as volume secretion (48%).

8271 IMPLICATION OF GASTRIC MUCOSAL HISTAMINE IN INHIBITION BY ISOPRENALINE OF PENTAGASTRIN-INDUCED GASTRIC SECRETION. *(E.)* Lundell, L.; Svensson, S. E. (Inst. Physiol., Univ. Lund, Sweden). *Br. J. Pharmacol.* 52(1):69-75, 1974.

The effect of isoprenaline (20-40 µg/kg/hr i.v.) on pentagastrin-induced release and formation of gastric mucosal histamine as well as on pentagastrin-induced gastric secretion was studied in female Sprague-Dawley rats fed a standard diet. Isoprenaline strongly inhibited pentagastrin-induced acid secretion, an inhibition which could not be overcome by increasing the dose of pentagastrin from 0.25 µg/hr to 16 µg/hr. Propranolol (2 mg/kg) blocked the inhibitory effect of isoprenaline on pentagastrin-induced acid secretion. Isoprenaline enhanced pepsin secretion induced by pentagastrin, an effect which was blocked by propranolol. It also reduced the increase in formation and release of gastric mucosal histamine following pentagastrin infusion, an inhibitory influence which was almost completely blocked by propranolol. The inhibition by isoprenaline of pentagastrin-induced acid secretion is tentatively related to alterations in gastric mucosal histamine occurring simultaneously.

8272 EFFECT OF H_2 RECEPTOR ANTAGONISTS ON HISTIDINE DECARBOXYLASE ACTIVITY IN RAT GASTRIC MUCOSA. *(E.)* Maudsley, D. V.; Kobayashi, Y.; Bouvaird, L.; Zeidel, M. (Worcester Fdn. Exp. Biol., Shrewsbury, Mass.). *Biochem. Pharmacol.* 23(21): 2963-2968, 1974.

The effects of the H_2 receptor antagonists, burimamide (50 mg/kg) and metiamide (25 mg/kg), on increasing histidine decarboxylase activity in the glandular stomach of female Charles River rats were studied. The drugs were given i.p. to 24 hr-starved animals. Tissue was removed at various times up to 6 hr thereafter and assayed for histidine decarboxylase activity. The increase in enzyme activity was reduced by cycloheximide (10 mg/kg) but not by actinomycin D (1 mg/kg). An inhibitor of histidine decarboxylase, 4-imidazolyl-3-amino-2-butanone (MeN-A-1293) was also effective in reducing the enzyme activity stimulated by the H_2 receptor antagonists. The time course and the magnitude of the response of the enzyme with maximum doses of burimamide were similar to those obtained with pentagastrin. The histamine content of the mucosa was also reduced by burimamide. These data are consistent with the hypothesis that H_2 receptor antagonists increase histidine decarboxylase activity by raising gastric pH and causing release of endogenous gastrin.

8273 HYDROCORTISONE ADMINISTRATION AND GASTRIN AND GASTRIC SECRETION IN DOGS. *(E.)* Watson, L. C.; Reeder, D. D.; Thompson, J. C. (Univ. Texas Med. Branch, Galveston). *Arch. Surg.* 109(4): 547-549, 1974.

Studies were undertaken in dogs to test the acute effect of administration of hydrocortisone (50, 100, 150 mg i.v. at 45 min intervals) and daily injection (100 mg/day for 5 days), on serum gastrin levels. Acute administration of hydrocortisone had no appreciable effect on serum gastrin levels: the mean basal concentration of 72 ± 3 pg/ml did not change significantly after the steroid infusions. Subacute administration produced a significant (20%) increase in serum gastrin (from 98 ± 5 pg/ml before hydrocortisone to 121 ± 7 pg/ml after treatment); as well as in serum gastrin response to a traditional meat meal (from 10.2 ± 2 ng-min/ml in the control study to 16.1 ± 3 ng-min/ml in the posthydrocortisone study). The increased serum gastrin levels following hydrocortisone administration were accompanied by a 100% increase in gastric acid output as determined by standard titration techniques. These findings suggest that at least 1 of the mechanisms of formation of steroid-induced ulcers is their effect on the hormonal mechanism leading to increased gastric acid levels.

8274 DIFFERENTIAL EFFECTS OF SALMON, PORCINE, AND HUMAN CALCITONIN ON GASTRIC SECRETION AND GASTRIC EMPTYING IN RATS. *(E.)* Bobalik, G. R.; Kleszynski, R. R.; Aldred, J. P.; Bastian, J. W. (Armour Pharmaceut. Co., Kankakee, Ill.). *Proc. Soc. Exp. Biol. Med.* 147(1):284-288, 1974.

The effects of porcine, salmon and human calcitonin were studied on gastric acid secretion in rats subjected to pyloric ligation, and on gastric emptying in normal rats. All animals were starved for 24 hr prior to the experiment. Calcitonin from all 3 sources at concentrations from 0.5-8.0 U/kg injected s.c. produced a dose-dependent inhibition of gastric acid secretion as well as a delay in gastric emptying time determined following ingestion of a meal containing Evan's blue dye. When standardized on the basis of their hypocalcemic potencies, human calcitonin was considerably less effective than either salmon or porcine calcitonin. Relative potencies were 0.06, 0.80 ± 0.63 and 1.00, resp., for acid secretion and 0.04 ± 0.02, 0.91 ± 0.13 and 1.00, resp., for gastric emptying. Thus, these effects are not mediated by changes in serum calcium.

8275 SECRETORY FUNCTION OF TOTALLY ISOLATED PORCINE STOMACH PERFUSED EX VIVO WITH HOMOLOGOUS BLOOD: EFFECT OF HISTAMINE. *(E.)* Kowalewski, K.; Secord, D. C.; Kolodej, A. (Univ. Alberta, Edmonton, Canada). *Can. J. Surg.* 17(5): 340-347, 1974.

A method of isolation and *ex vivo* perfusion of the whole porcine stomach is described. The stomach was perfused extracorporeally with homologous blood of a supporting pig which served as a living oxygenator and dialyzer. Histamine (150 µg/hr) given by intraarterial infusion was used as a secretagogue.

Samples of gastric juice and blood were collected every 30 min during the perfusion period for analysis. All porcine stomachs secreted H$^+$ and pepsin. The results demonstrated that *ex vivo* porcine stomachs secreted about 1/3 of the volume and acid but about five times more pepsin than did canine stomachs in similar situations. This new experimental tool appears to be adequate for the study of gastric secretory function of the porcine stomach.

8276 ALTERATIONS IN HISTAMINE METABOLISM OF RAT GASTRIC MUCOSA FOLLOWING VAGOTOMY. *(E.)* Lundell, L.; Rosengren, E.; Svensson, S. E. (Inst. Physiol., Univ. Lund, Sweden). *J. Physiol. (Lond.)* 242(1):209-218, 1974.

The effects of truncal vagotomy plus pyloroplasty alone, or sham operation on the formation of gastric mucosal and whole body histamine were determined in female Sprague-Dawley rats fed a histamine-free diet. Following truncal vagotomy with pyloroplasty, mucosal histamine formation determined *in vitro* increased by 5-fold and was associated with elevated mucosal histamine levels and an enhanced urinary histamine excretion. Infusion of i.v. pentagastrin (8 µg/hr) produced a 2-fold increase in mucosal histamine formation following vagotomy and pyloroplasty and a 7-fold increase in sham-operated controls. Mucosal histamine content in both groups subsequently fell over a 3-hr period to comparable levels during which time urinary histamine excretion was appropriately enhanced. In studies where ^{14}C-histidine was injected and urinary ^{14}C-histamine was subsequently measured, newly synthesized histamine was more slowly mobilized during the first hr of pentagastrin infusion following vagotomy and pyloroplasty than following sham operation. Rats subjected only to pyloroplasty and infused with pentagastrin showed a significantly higher increase in urinary histamine than did the sham operated controls. Kinetic studies using ^{14}C-histidine showed that this was probably due to a preferential mobilization of preformed intracellular histamine.

8277 HISTAMINE METABOLISM OF THE GASTRIC MUCOSA FOLLOWING ANTRECTOMY. *(E.)* Lundell, L. (Inst. Physiol., Univ. Lund, Sweden). *J. Physiol. (Lond.)* 241(2):437-451, 1974.

Mucosal histamine metabolism was studied in female Sprague-Dawley rats maintained on a histamine-free diet and subjected to antrectomy, antrum exclusion, or total gastrectomy with or without subsequent i.v. pentagastrin substitution (8 µg/hr). Antrectomy resulted in approximately a 67% decrease in gastric mucosal histamine formation as determined by biochemical assay, whereas antrum exclusion produced a more than a 2.5-fold increase. Mucosal histamine content also decreased after antrectomy and increased following antrum exclusion. Whole body histamine formation, as determined from the rate of urinary histamine excretion, was decreased by 50% following total gastrectomy. Pentagastrin infusion failed to increase histamine excretion, as it did in animals with intact stomachs, indicating that histamine was not mobilized from extra-gastric sources. Determination of the rate of urinary excretion of ^{14}C-histidine showed that histamine was mobilized initially to a larger extent in pentagastrin infused antrectomized animals than in control rats. Studies of the rate of histamine excretion in antrectomized rats supplemented with daily pentagastrin injections showed that after 3 weeks, histamine excretion was 1.5-fold higher than in the nonsubstituted group, but was the same after 6 weeks. Pentagastrin was less effective in elevating mucosal histamine formation in nonsubstituted antrectomized rats than in the substituted and sham operated animals. These results emphasize the predominant role of antral gastrin in sustaining mucosal histamine formation as well as the responsiveness of histidine decarboxylase to stimulation by pentagastrin or gastrin.

8278 SPECIFIC INTRINSIC FACTOR (IF) ISOPROTEINS IN HUMAN GASTRIC MUCOSA. *(E.)* Grasbeck, R.; Marcoullis, G. (Minerva Fdn. Inst. Med. Res., Helsinki, Finland). *Eur. J. Clin. Invest.* 4(5):365, 1974.

8279 CLINICAL EVALUATION OF GASTRIC INHIBITOR SUBSTANCE. *(E.)* Evans, S. M.; Switala, K. J.; Hoffman, N. E.; Armstrong, R. N.; Larson, S. J.; Sances, A. (Med. Coll. Wisconsin, Milwaukee). *Clin. Res.* 22(4):636A, 1974.

8280 THE SECRETION OF A, B, H AND LEWIS BLOOD GROUP SUBSTANCES IN THE GASTRIC JUICE AND SALIVA OF CHACMA BABOONS (Papio Ursinus, KERR) AND VERVET MONKEYS (Cercopithecus Pygerythrus, CUVIER). *(E.)* Downing, H. J.; Moores, P. P.; Bolstridge, M. C.; Schleyer, M. E.; Klomfass, H. J.; Davidson, G. R. (Natal Inst. Immunol., Durban, South Africa). *J. Med. Prim.* 3(3):185-194, 1974.

8281 ELECTRON MICROSCOPICAL OBSERVATIONS ON THE SECRETORY PROCESS OF THE PARIETAL CELLS. *(E.)* Helander, H. F. (Dept. Anat., Univ. Umea, Sweden). *Scand. J. Gastroenterol.* 9(27):20-21, 1974.

8282 SECRETION IN TOTALLY ISOLATED PORCINE STOMACH. *(E.)* Kowalewski, K.; Secord, D. C.; Kolodej, A. (Surg. Med. Res. Inst., Univ. Alberta, Edmonton, Canada). *Surg. Gynecol. Obstet.* 139(3):337-340, 1974.

8283 SYMPATHOMIMETIC AMINES AND GASTRIC SECRETION IN RATS. *(E)*. Fjalland, B. (Dept. Pharmacol. Toxicol., H. Lundbeck & Co., Valby, Denmark). *Acta Pharmacol. Toxicol.* 35(4):293-299, 1974.

8284 DIFFERENCES IN THE GASTRO-SECRETORY EFFECT OF GASTRIN AND GSP (GASTROSECRETAGOGUE PANCREAS PEPTIDE). *(E.)* Pointner, H.; Flegel, U. (1st Dept. Med., Univ. Vienna, Austria). *Acta Hepatogastroenterol.* 21(3):224-227, 1974.

8285 RELATION BETWEEN GASTRIN RESPONSE TO FOOD STIMULATION AND PENTAGASTRIN-STIMULATED GASTRIC ACID SECRETION IN NORMAL HUMANS. *(E.)* Gedde-Dahl, D. (Rikshosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(5):447-450, 1974.

8286 STATE OF THE HUMAN GASTRIC SECRETORY FUNCTION WITH INTAKE OF AN ARTIFICIAL RATION. *(E.)* Potemkina, L. S. (no affil.). *Aerosp. Med. Biol.* 7011(132):279, 1974.

8287 ANTRAL RELEASE OF GASTRIN. *(E.)* Fell, G.; Cunningham, R.; Douglas, M.; Smallwood, R. A.; Hansky, J.; Stening, G. F. (Austin Hosp., Heidelberg, Australia). *Aust. NZ J. Med.* 4(3):301-302, 1974.

8288 EFFECT OF ATROPINE ON ACID SECRETION AND SERUM GASTRIN AFTER FEEDING IN CATS WITH DENERVATED FUNDIC POUCHES. *(E.)* Svensson, S. O.; Emas, S.; Dorner, M.; Kaess, H. (Karolinska Hosp., Stockholm, Sweden). *Scand. J. Gastroenterol.* 9(27):39-40, 1974.

8289 EFFECT OF CALCIUM AND PENTAGASTRIN ON THE GASTRIC SECRETION OF ACID, PEPSIN AND INTRINSIC FACTOR (IF) IN MAN. *(E.)* Vatn, M. H.; Berstad, A.; Schrumpf, E. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(27):41, 1974.

8290 COMBINED EFFECT OF CALCIUM AND MAGNESIUM ON GASTRIC ACID- AND GASTRIN SECRETION. *(E.)* Christiansen, J.; Rehfeld, J. F.; Stadil, F. (Bispebjerg Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(27):40-41, 1974.

8291 EFFECT OF INTRAVENOUS ANAESTHETICS ON ACID SECRETORY RESPONSES IN DENERVATED GASTRIC POUCHES. *(E.)* Schofield, B.; Tepperman, B. L. (Div. Med. Physiol., Univ. Calgary, Canada). *J. Physiol. (Lond.)* 241(2):125P-126P, 1974.

8292 PHOSPHODIESTERASE INHIBITION BY INDOMETHACIN AND AETHANOL IN THE GASTRIC MUCOSA OF THE GUINEA PIG. *(E.)* Karppanen, H.; Puurunen, J. (Dept. Pharmacol., Univ. Oulu, Finland). *Acta Pharmacol. Toxicol.* 35(Suppl):36, 1974.

8293 EFFECT OF ETHANOL ON PERMEABILITY AND ION TRANSPORT IN THE ISOLATED DOG STOMACH. *(E.)* Kuo, Y. J.; Shanbour, L. L.; Sernka, T. J. (Univ. Texas Med. Sch., Houston). *Am. J. Dig. Dis.* 19(9):818-824, 1974.

8294 EVALUATION OF GASTRIC ANTIPROTEASE-ANTIPEPSIN ACTIVITY OF CARRAGEENAN IN HUMANS. *(E.)* Smyth, R. D.; Bodi, T.; Herczeg, T. L.; Siplet, H. (Res. Div., William H. Rorer, Inc., Fort Washington, Pa.). *Am. J. Gastroenterol.* 62(2):124-129, 1974.

8295 COMPARISON OF EFFECTS OF METIAMIDE AND ATROPINE ON GASTRIC AND PANCREATIC SECRETION AND PEPTIC ULCER FORMATION IN CAT. *(E.)* Konturek, S. J.; Radecki, T.; Demitrescu, T.; Dembinski, A. (Med. Acad., Krakow, Poland). *Digestion* 10(4-5):267-281, 1974.

8296 EFFECT OF SYNTHETIC 15-METHYL ANALOG OF PROSTAGLANDIN E_2 ON GASTRIC SECRETION AND PEPTIC ULCER FORMATION. *(E.)* Konturek, S. J.; Radecki, T.; Demitrescu, T.; Kwiecien, N.; Pucher, A.; Robert, A. (Med. Acad., Krakow, Poland). *J. Lab. Clin. Med.* 84(5):716-725, 1974.

8297 UPTAKE AND METABOLISM OF HISTIDINE DURING STRESS. *(E.)* Huszti, Z.; Sourkes, T. L. (Dept. Psychiatry, McGill Univ., Montreal, Canada). *Can. J. Biochem.* 52(9):782-788, 1974.

8298 THE EFFECT OF SEPSIS ON ACUTE GASTRIC ULCERATIONS IN THE RAT. *(E.)* Rasche, R.; Butterfield, W. C. (St. Mary's Hosp., Waterbury, Conn.). *Surgery* 76(5):764-770, 1974.

8299 ABSORPTION AND LOCAL UPTAKE OF TRITIATED 7,12-DIMETHYLBENZ(A)ANTHRACENE IN EXPERIMENTAL ATROPHIC GASTRITIS. *(E.)* Capoferro, R. (Rikshosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(6):527-532, 1974.

8300 IMPAIRMENT OF GASTRIC SECRETION IN EXPERIMENTAL LIVER DISEASE. *(Rus.)* Dashkovskaia, V. S. (N. V. Skifosovskii Res. Inst. First Aid, Moscow, USSR). *Biull. Eksp. Biol. Med.* 77(6):30-33, 1974.

8301 THE ROLE OF AFFERENT INTESTINAL INNERVATION IN INHIBITION OF GASTRIC SECRETION BY FATS. *(Rus.)* Gazhala, E. M.; Zaks, M. G. (I. M. Sechenov Inst. Evolut. Physiol. Biochem., Leningrad, USSR). *Fiziol. Zh. SSSR* 60(9):1328-1335, 1974.

8302 THE EFFECT OF ADRENERGIC AGENTS ON GASTRIC SECRETION AS RELATED TO ITS INITIAL LEVEL. *(Rus.)* Okun, K. B. (Riga Med. Inst., USSR). *Ter. Arkh.* 46(4):114-118, 1974.

8303 THE EVALUATION OF ATROPINE ACTION ON THE PARTIAL COMPONENTS OF GASTRIC SECRETION. *(Rus.)* Masevich, Ts. G.; Fishzon-Riss, Iu. I.; Mikhailichenko, O. I. (Leningrad Med. Inst. Sanit. Hyg., USSR). *Ter. Arkh.* 46(4):90-93, 1974.

8304 PROSTAGLANDINS AND THE GASTROINTESTINAL TRACT. *(Rus.)* Radbil, O. S. (All-Union Sci. Res. Inst. Med. Medtech. Information, Moscow, USSR). *Ter. Arkh.* 46(4):6-14, 1974.

8305 CHOLINERGIC MECHANISM OF PROTEIN METABOLISM AND NUCLEIC ACID REGULATION IN GASTRIC MUCOSA. *(Rus.)* Svistun, T. I.; Zagorodneva, A. G.; Gofshtein, V. Sh. (A. A. Bohomolets Inst. Physiol., Kiev, USSR). *Biull. Eksp. Biol. Med.* 77(6):9-11, 1974.

8306 EXPERIMENTAL REACTION OF CHEMICAL AGENTS WITH GASTRIC JUICE TO ESTABLISH WATER QUALITY STANDARDS. *(Rus.)* Fedianina, V. N.; Ekshtat, B. Ia. (Novosibirsk Res. Inst. Sanit., USSR). *Gig. Sanit.* (7):58-61, 1974.

See also, 8143, 8237, 8238, 8248, 8416, 8500, 8519, 8523, 8532, 8844.

SECRETION AND METABOLISM

Pancreas

8307 CAERULEIN-SECRETIN COMBINATION IN THE FUNCTIONAL EXPLORATION OF THE EXOCRINE PANCREAS. *(E.)* Duffaut, M.; Vaysse, N.; Louis, A.; Ribet, A. (Purpan Hosp., Toulouse, France). *Digestion* 10(3):217-218, 1974.

8308 POLYRIBOSOME DEGRADATION AS A SENSITIVE ASSAY FOR ENDOLYTIC MESSENGER-RIBONUCLEASE ACTIVITY. *(E.)* Davies, E.; Larkins, B. A. (Sch. Life Sci., Univ. Nebraska, Lincoln). *Anal. Biochem.* 61(1):155-164, 1974.

8309 INTERACTIONS OF COLIPASE WITH BILE SALTS. *(E.)* Desnuelle, P.; Charles, M.; Sari, H.; Erlanson, C. (CNRS, Marseille, France). *Digestion* 10(3):216, 1974.

8310 EFFECT OF PARENTERALLY-INJECTED CASEIN AND PRODUCTS OF ITS HYDROLYSIS ON EXOCRINE SECRETION OF THE PANCREAS. *(Rus.)* Sisoiev, Iu. A.; Ekimovskii, A. P. (Inst. Nutr., USSR Acad. Med. Sci., Moscow). *Vopr. Pitan.* (4):15-18, 1974.

8311 THE EFFECTS OF α- AND β-ADRENERGIC BLOCKING AGENTS ON EXOCRINE PANCREATIC SECRETION STIMULATED BY SECRETIN AND CHOLECYSTOKININ-PANCREOZYMIN IN DOGS. *(Fr.)* Dzieniszwski, J.; Tiscornia, O. M.; Palasciano, G.; Sarles, H. (Res. Unit Dig. Dis., INSERM, Marseille, France). *Biol. Gastroenterol. (Paris)* 7(2):131-138, 1974.

8312 ENZYME SECRETION OF THE PANCREAS IN STARVATION. *(Rus.)* Shlygin, G. K.; Vasilevskaia, L. S. (Inst. Nutr., Moscow, USSR). *Biull. Eksp. Biol. Med.* 77(6):27-30, 1974.

See also, 8268, 8284, 8417.

SECRETION AND METABOLISM

Hepatobiliary Tract

8313 LONG-TERM PERFUSION OF THE ISOLATED RAT LIVER. MAINTENANCE OF ITS FUNCTIONAL STATE BY USE OF A FLUOROCARBON EMULSION. *(E.)* Krone, W.; Huttner, W. B.; Kampf, S. C.; Rittich, B.; Seitz, H. J.; Tarnowski, W. (Inst. Physiol. Chem., Univ. Hamburg, Germany). *Biochim. Biophys. Acta* 372(1):55-71, 1974.

A fluorocarbon emulsion containing liquid fluorocarbon 43 made up in the nonionic detergent Pluronic F 68 by sonication and diluted with a saline buffer was tested as a long-term perfusion system for periods up to 20 hr in the isolated male Wistar rat liver. All livers perfused with the fluorocarbon medium released phosphoglucose isomerase, glutamate-oxaloacetate transaminase, and glutamate dehydrogenase almost linearly at a low basal rate, glutamate dehydrogenase release beginning after 5 hr perfusion. In contrast, a certain percentage of the livers perfused with a red cell-containing medium showed an exponential enzyme release which was over two standard deviations above the mean of the livers perfused with the fluorocarbon mixture, the values being 25% for phosphoglucose isomerase, 38% for glutamate-oxaloacetate transaminase, and 87% for glutamate dehydrogenase after 10 hr of perfusion. Liver functions examined in fluorocarbon-perfused and red cell-perfused livers during a 10 hr period were metabolite state, galactose elimination from the perfusate, induction of tyrosine aminotransferase by dexamethasone, and gluconeogenesis from lactate and bile production. The fluorocarbon medium provided at least the same or an even better hepatic function than did the red cell-containing medium. However, while in red cell-perfused livers functional impairment always occurred at various percentages, this was never observed with the fluorocarbon medium. Electron microscopic examination of the livers perfused with the fluorocarbon medium showed no disturbance of the mitochondrial matrix and cristae after a 10 hr perfusion.

8314 LIPOPROTEINS IN A NONRECIRCULATING PERFUSATE OF RAT LIVER. *(E.)* Marsh, J. B. (Sch. Dent. Med., Univ. Pennsylvania, Philadelphia). *J. Lipid Res.* 15(6):544-550, 1974.

Rat (male Holtzman, 250-400 g) livers were perfused in a nonrecirculating system for 30-40 min with Krebs-Ringer bicarbonate-0.1% glucose solution gassed with 95% O_2-5% CO_2 at 37 C at a flow rate of 3 ml/g/min. The livers appeared normal as judged by O_2 uptake, bile flow, transaminase release, and net protein output (2.5 mg/g/hr). The perfusate was concentrated by ultrafiltration, subjected to sequential ultracentrifugation at solution densities of 1.006, 1.04, 1.06, and 1.21, and the top fractions analyzed for protein and lipid. The net release of protein in the 4 density classes, averaged 39, 10, 5 and 20 μg/g/hr. The lipid composition of the perfusate lipoprotein fractions differed from that of serum mainly in the high percentage of free cholesterol. It is concluded that the rat liver secretes very low-density lipoprotein (VLDL), high-density lipoprotein (HDL), and a modified form of VLDL containing less lipid. Comparison of secretion rates and serum lipoprotein levels leads to the conclusion that the latter are largely determined by catabolic rates. When labeled amino acids were present, the perfusate HDL had a higher specific activity than VLDL. Addition of carrier whole serum did not alter recovery of labeled lipoproteins, but when these were isolated from Golgi membranes after a 40-min perfusion, more than twice as much label was recovered in HDL, suggesting the presence of precursors within the Golgi. The main advantages of the nonrecirculation perfusion technique are the avoidance of catabolic reactions, simplicity, and complete control over the composition of the perfusing medium.

8315 ESTIMATION OF FUNCTIONAL HEPATIC MASS IN RESECTED AND REGENERATING RAT LIVER. *(E.)* Rikkers, L. F.; Moody, F. G. (Univ. Utah Med. Ctr., Salt Lake City). *Gastroenterology* 67(4):691-699, 1974.

The kinetics of indocyanine green (ICG) removal by control, partially resected, and regenerating male Sprague-Dawley rat livers were studied to test the hypothesis that its maximal rate of removal is a reliable measure of hepatic functional mass. ICG analysis was performed in a total of 200 rats, only 9 of which were not included in the final data computation. Hepatic uptake of ICG administered in incremental doses followed Michaelis-Menten kinetics, thereby providing a means of calculating maximal rate of uptake (R_{max}) from removal rates of sub-maximal doses. Decrease in hepatic mass by weight after 35 and 65% hepatectomy could be identified with a reasonable degree of accuracy by determination of R_{max}. R_{max} closely correlated with return of liver weight during hepatic regeneration. Serum bilirubin, alkaline phosphatase, albumin, and transaminase were not related to liver weight. Temperature had a profound effect on ICG uptake with hyperthermia causing a reduction in R_{max}. Under these experimental conditions, estimation of maximal removal rate for ICG provided a relatively reliable (about ± 10%) method of quantitating hepatic mass.

8316 MEASUREMENT OF PROTEIN TURNOVER IN RAT LIVER WITH [^{14}C]CARBONATE: PROTEIN TURNOVER DURING LIVER REGENERATION. *(E.)* Swick, R. W.; Ip, M. M. (Dept. Nutr. Sci., Univ. Wisconsin, Madison). *J. Biol. Chem.* 249(21):6836-6841, 1974.

Several isotopic methods for measuring liver protein turnover were compared in a study of plasma albumin and the mixed hepatic proteins during liver regeneration in young Holtzman rats. In albumin after i.v. or i.p. administration of ^{14}C-carbonate (1 mC), the rate of decay of the radioactivity of the intact protein was similar to that of arginine isolated from the protein, whereas after the administration of guanidino-^{14}C-arginine (45 μC), the decay rate was 30% slower than that obtained with ^{14}C-carbonate. When guanidino-^{14}C-arginine is given, the extrahepatic tissues, such as muscle, and the plasma globulins, are labeled more heavily than the liver proteins. The reutilization of this extrahepatic arginine by the liver probably accounts for the slower disappearance of radioactivity from albumin. Similar results were obtained with the mixed, indigenous hepatic proteins. In partially hepatectomized animals, the decay in radioactivity in arginine after ^{14}C-carbonate administration showed that the rate of protein breakdown was reduced by 30% during the first 5 days of liver regeneration. There was no decay in radioactivity in similar animals given guanidino-^{14}C-arginine, suggesting a massive transfer of labeled extrahepatic protein arginine into the liver during regeneration.

8317 VALIDITY OF USING 2,4-^{3}H-LABELED BILE ACIDS TO STUDY BILE ACID KINETICS IN MAN. *(E.)* LaRusso, N. F.; Hoffman, N. E.; Hofmann, A. F. (Mayo Clin., Rochester, Minn.). *J. Lab. Clin. Med.* 84(5):759-765, 1974.

[2,2',4,4'-^{3}H]Chenodeoxycholic acid was administered i.v. simultaneously with [24-^{14}C]chenodeoxycholic acid to 2 healthy subjects, and the ^{3}H/^{14}C ratio in bile samples was measured daily for 6 days by liquid scintillation spectroscopy. This ratio remained identical to that administered, indicating stability of the label. Approximately 12% of administered ^{3}H entered body water and 5-10% was excreted in the urine as $^{3}H_2O$ in 6 days. In similar studies with [2,2',4,4'-^{3}H]cholic acid and [24-^{14}C]-cholic acid in 3 subjects, biliary cholic acid and deoxycholic acid were isolated chromatographically and the ^{3}H/^{14}C ratio of each bile acid was determined. For cholic acid, about 10% of administered ^{3}H was lost the 1st day; after that, the ^{3}H/^{14}C ratio remained constant. In deoxycholic acid, the ^{3}H/^{14}C ratio was 30-40% lower than in that administered. Approximately 25% of administered ^{3}H entered body water and 8% was excreted in the urine as $^{3}H_2O$ in 6 days. On anaerobic incubation of [2,4-^{3}H] cholic and [2,4-^{3}H] chenodeoxycholic acids with fresh feces, 20-35% of the label was released as $^{3}H_2O$. Seven of 24 strains of bacteria tested were capable of releasing ^{3}H as $^{3}H_2O$ when incubated anaerobically with [2,4-^{3}H]cholic acid, but the fraction ^{3}H released was much less than that during fecal incubation. Determination of bile acid kinetics in healthy subjects is valid with [2,2',4,4'-^{3}H]-chenodeoxycholic acid and has an error of $<$ 10% with [2,2',4,4'-^{3}H]cholic acid. However, the 2,2',4,4'-^{3}H label appears unsatisfactory for tracing the complete metabolic fate of the steroid moiety of bile acids in healthy man because ^{3}H is removed by bacteria during intestinal passage after the labeled bile acids leave the exchangeable bile acid pool.

8318 DISTRIBUTION OF LIVER PLASMA MEMBRANE 5' NUCLEOTIDASE AS INDICATED BY ITS REACTION WITH ANTI-PLASMA MEMBRANE SERUM.

(E.) Gurd, J. W.; Evans, W. H. (Natl. Inst. Med. Res., London, England). *Arch. Biochem. Biophys.* 164(1):305-311, 1974.

Antisera, highly specific for mouse liver surface membranes was produced to investigate the properties of 5' nucleotidase (5'N). Purified mouse liver surface membranes (50 μg, 1 U 5' AMPase) were preincubated for 60 min at room temperature with increasing amounts of antisera. The result was a progressive inhibition of 5'N activity until a maximal inhibition of 80-90% was attained. Nonimmune serum and antiserum preabsorbed with the plasma-membrane fraction possessed no inhibitory activity. Purified 5'N (0.4 U) and phosphodiesterase (0.25 U) were incubated with immune γ-globulin for 60 min at room temperature followed by 18 hr at 4 C prior to the determination of enzyme activity. Purified 5'N was completely sensitive to antibody inhibition but phosphodiesterase activity was unaffected. The preincubated surface membranes also failed to inhibit nucleotide pyrophosphatase or insulin binding. Membrane bound 5'N and purified enzyme (0.4 U) were incubated separately with sufficient amount of antiserum to produce approximately 50% inhibition. Inhibition curves from both enzymes were similar and of the noncompetitive type. The inhibitory effect of antiserum (1-50 μl) on 5'N activity present in light (120 μg), and heavy (250 μg) plasma membrane fractions was determined and both fractions were equally sensitive to the antibody. Anti-mouse liver plasma membrane antiserum on 5'N activity of mouse liver (25 μg), rat liver (75 μg), and pig lymphocyte (75 μg) surface membranes showed that the enzymatic activity in each of these membranes was inhibited to a similar extent. The reaction of an antibody with a membrane bound enzyme is evidence that the portion of the protein containing the antigenic site is exposed on the membrane surface. These results are consistent with the studies which indicated that 5'N was located on the outer surface of the plasma membrane lining the bile space, and also with the findings that the enzyme is a glycoprotein.

8319 DEVELOPMENTAL CHANGES IN RAT LIVER XANTHINE OXIDASE(S) AND ITS INTRACELLULAR DISTRIBUTION.

(E.) Hashimoto, S. (Life Sci. Lab., Ajinomoto Co., Inc., Yokohama, Japan). *Agr. Biol. Chem.* 38(9):1697-1702, 1974.

Developmental changes and subcellular distribution of xanthine oxidase in the livers of male pre- and postnatal Wistar rats were examined. The rats were sacrificed by decapitation, the liver removed and homogenized, and the liver homogenate centrifuged at 100,000 X g for 60 min at 0 C. Xanthine oxidase activity was measured spectrophotometrically. The specific activity of the fetal liver xanthine oxidase increased sharply to the levels of the adult liver on the day of birth. After birth, the activity dropped rapidly until the 14th day after birth when it was about 1/4 that of the adult level. About the 28th day after birth, the activity had again risen to the level found on the day of birth. In the livers of 80 day-old rats, about 60% of the total xanthine oxidase activity was found in the soluble fraction and the rest was distributed among particulate fractions including microsomal, lysosomal, mitochondrial, and nuclear fractions. In contrast to the adult livers, 80% of total xanthine oxidase activity in fetal liver was found in particulate fractions. It is suggested that there may be two types of liver xanthine oxidase, one a fetal type, present mainly in the particulate fraction; and the other an adult type, present mainly in the soluble fraction.

8320 BIOSYNTHESIS OF LIPIDS IN GOLGI COMPLEX AND OTHER SUBCELLULAR FRACTIONS FROM RAT LIVER.

(E.) Van Golde, L. M. G.; Raben, J.; Batenburg, J. J.; Fleisher, B.; Zambrano, F.; Fleischer, S. (Lab. Vet. Biochem., State Univ. Utrecht, Netherlands). *Biochim. Biophys. Acta* 360(2):179-192, 1974.

Various subcellular fractions, including the Golgi apparatus, were isolated from rat liver and were assayed biochemically for the following: 1) synthesis of sphingomyelin, ceramide choline phosphotransferase (CDP) diglycerides, phosphatidylinositol and phosphatidylserine; 2) conversion of phosphatidylserine to phosphatidylethanolamine; 3) formation of lecithin *via* N-methylation; and 4) activation of palmitic and octanoic acids. Purity of the various subcellular fractions was assessed using specific marker enzymes. The principal site for synthesis of sphingomyelin, CDP diglycerides, phosphatidylinositol, phosphatidylserine, and lecithin is the endoplasmic reticulum. With the exception of CDP diglyceride synthesis, however, mitochondria possess none of these abilities, although the inner mitochondrial membrane is the only cellular site of phosphatidylserine decarboxylation. Palmitate activation takes place primarily in the endoplasmic reticulum and the mitochondria although plasma membranes also possess a small amount of activity. The subcellular distribution of octanoyl-coenzyme A (CoA) synthetase is similar to that of palmitoyl-CoA synthetase, except that octanoyl CoA synthetase activity is greater in mitochondria than in microsomes.

8321 LIPID PEROXIDES AND THE INDUCTION OF HEPATIC MICROSOMAL CYTOCHROME P-450 IN THE RAT.

(E.) Marshall, W. J.; Naughton, C. (King's Coll. Hosp. Med. Sch., London, England). *Biochem. Soc. Trans.* 2(5):992-994, 1974.

The hypothesis that the induction of hepatic microsomal cytochrome P-450 is mediated through an endogenous inducer, and that this inducer is a lipid peroxide or some related substance, was investigated in male Wistar rats fed a standard laboratory diet. Microsomal fractions were prepared, the cytochrome P-450 was measured, and the peroxide content of liver homogenates was determined by an iodometric method. After a single injection of phenobarbital (100 mg/kg, i.p.), cytochrome P-450 concentrations were unchanged for 6 hr, slightly increased after 9 hr, and significantly increased after 12 hr. In contrast, peroxide concentration in the liver increased rapidly between 3 and 6 hr, giving a 5-fold increase over the initial value at 6 hr. A high concentration was maintained while cytochrome P-450 concentration was increasing, but by 72 hr peroxide concentration had returned to baseline values. These results support the suggestion that the induction of hepatic microsomal cytochrome P-450 is mediated through an endogenous lipid peroxide.

8322 VITAMIN E, STEROIDS, AND LIVER MICROSOMAL HYDROXYLATIONS.

(E.) Carpenter, M. P.; Howard, Jr., C. N. (Oklahoma Med. Res. Fdn., Oklahoma City). *Am. J. Clin. Nutr.* 27(9):966-979, 1974.

Drug metabolism, microsomal cytochromes, and lipid peroxidation by liver microsomes of control rats fed a vitamin E-supplemented diet, and of experimental rats fed a vitamin E-deficient diet were compared to determine whether the effect of α-tocopherol on microsomal oxidases is mediated *via* androgens, or is independent of these steroids. The animals used in the study were adult male albino rats derived from the Holtzman-Sprague-Dawley strain. Identical analyses were also made of control and experimental rats that were castrated, adrenalectomized, or both. Groups of rats in which steroid producing organs were surgically removed were treated with appropriate replacement steroids or α-tocopherol. To determine whether the effect of α-tocopherol on microsomal hydroxylations was similar to that of phenobarbital, induction by this drug was also studied in unoperated, castrated, adrenalectomized, and castrated-adrenalectomized rats. The specific activities were not decreased in vitamin E-supplemented animals after castration, unlike those of the vitamin E-deficient rats. Adrenalectomy resulted in a diminution in both groups. In the vitamin E-deficient rat the effect of castration could be reversed with α-tocopherol or testosterone. Corticosterone plus hydrocortisone partially restored activity in adrenalectomized controls and experimentals, and in the latter group vitamin E had the same effect. Steroid hormones were partially restored in controls and experimentals that had been castrated and adrenalectomized. These effects were also seen with tocopherol treatment of the double-operated experimentals. The effect of phenobarbital as an inducer was found to depend in part on the androgen status of the animals but part of the effect was independent of this factor. With regard to phenobarbital induction, the vitamin E-supplemented animal was less dependent on androgen than the deficient rat and the requirement for androgen in the experimental animal was replaced by tocopherol.

8323 HEPATIC BIOSYNTHESIS OF CHOLESTEROL IN MAN: NORMAL RANGE AND CHANGES INDUCED BY DRUGS.

(E.) Bamonti, F. (Gen. Reg. Hosp., Ancona, Italy). *Rend. Gastroenterol.* 5(3):220, 1973.

Studies were performed to evaluate the rate of hepatic cholesterol synthesis (HCS) in normal human liver and to investigate changes in HCS following treatment with drugs known to induce microsomal enzymes. The HCS was estimated with a few milligrams of tissue obtained by needle biopsy in 54 human subjects. Measurements were made of the incorporation of radiocarbon-labeled acetate into digitonin-precipitable sterols. The average rate of HCS in 19 normal subjects was 401 ± 119 nM/g/2 hr, while the average rate in 8 patients with extrahepatic cholestasis was 748 ± 300. Incorporation of labeled acetate into digitonin-precipitable sterols for 4 patients with steatosis and latent diabetes was in the normal range. Mean values of HCS in 12 subjects treated with diazepam were 2210 and 1225 nM/g, resp., after the 4th day of treatment and from 3-6 days after suspension of the drug. The average HCS value in 2 patients treated with phenobarbital was 935 nM/g on the 5th or 6th day of treatment, while in 5 other subjects it was 439 nM/g at 4-5 days after drug withdrawal. During therapy with prednisolone or with phenothiazine, the synthesis rate was 1089 nM/g (1 subject) and 477 nM/g (3 subjects), resp. All drugs were given at therapeutic doses. Changes in cholesterolemia were not observed. The results indicate that some drugs which induce microsomal enzymes of the hepatocyte may cause marked and unexpected clinically silent changes in cholesterol metabolism. The possibility of such undesirable effects must be taken into consideration, especially in long-term therapy.

8324 THE INDUCTION OF HEPATIC CHOLESTEROL SYNTHESIS IN THE RAT BY LECITHIN MESOPHASE INFUSIONS.

(E.) Jakoi, L; Quarfordt, S. H. (VA

Hosp., Durham, N.C.). *J. Biol. Chem.* 249(18):5840-5844, 1974.

Studies were conducted to determine the mechanism of the increased hepatic cholesterol synthesis observed in rats following infusion of lecithin mesophase dispersions. A 4-hour i.v. infusion of egg lecithin (20 mg/ml, 2.3 ml/hr) produced a 3- to 10-fold increase in hepatic cholesterol synthesis from acetate in both liver slices and homogenates. Direct *in vitro* additions of lecithin to the homogenates produced no change in the conversion of acetate to cholesterol. Mevalonate conversion to cholesterol in both homogenates and slices was unchanged by lecithin infusions. An increase of similar magnitude in the activity of the enzyme 3-hydroxy-3-methylglutaryl coenzyme A reductase was seen after the lecithin infusion. This increase in enzyme activity was associated with a significantly lower microsomal cholesterol content. The increase in cholesterol synthesis was prevented when the infused lecithin was made to molar ratios of cholesterol to lecithin greater than 0.5:1. Cholesterol-lecithin infusions with molar ratios of 1:1 appeared to inhibit conversion of acetate to cholesterol. The cholesterol content of the microsomes following these infusions was greater than control. Pretreatment of the animals with cycloheximide (0.5 mg/100 g) abolished the activation of cholesterol synthesis by lecithin, but actinomycin D (30 µg/100 g) had no effect. These results suggest that the accelerated hepatic cholesterol synthesis following lecithin infusion is a compensatory response to depletion of liver cholesterol levels and that mesophase infusion possibly influences translational control of regulatory enzyme production.

8325 TAUROCHOLATE EXCRETION AND BILE FORMATION IN THE ISOLATED PERFUSED RAT LIVER. AN IN VITRO-IN VIVO COMPARISON. *(E.)* Paumgartner, G.; Herz, R.; Sauter, K.; Schwarz, H. P. (Inst. Clin. Pharmacol., Univ. Bern, Switzerland). *Naunyn Schmiedebergs Arch. Pharmacol.* 285(2):165-174, 1974.

The excretory transport maximum (Tm) for taurocholate was determined in the perfused rat liver and compared to that obtained in the intact rat. An *in situ* liver perfusion system employing a semisynthetic perfusion medium containing Krebs-Ringer-bicarbonate solution, bovine erythrocytes, and bovine albumin was used in a total of 21 male Sprague-Dawley rats weighing 232-272 g. Total bile acids in bile were determined enzymatically using a 3α-hydroxysteroid dehydrogenase; mean recovery of sodium taurocholate added to bile was 98%. In contrast to the BSP-Tm, the taurocholate-Tm was 45% smaller *in vitro* (196 ± 17 nM/min/g liver) than *in vivo* (357 ± 10 nM/min/g liver), indicating that bile salt transport is more susceptible to alterations induced by the conditions of perfusion than BSP transport. At a low taurocholate infusion rate (57 nM/min/g liver) the normal relationship between bile salt excretion and bile flow observed *in vivo* was maintained in the perfused liver. At higher taurocholate infusion rates, however, bile flow, for a given bile salt excretion rate, was smaller than *in vivo*. Theoretically, a decrease of the osmotic activity of bile salts or an inhibition of bile salt independent bile formation could be responsible for this effect. Although the 1st possibility cannot be excluded, the 2nd appears more likely. These findings should be taken into account when the isolated perfused rat liver is employed for studies of bile formation.

8326 HEPATIC ACTION OF VASOPRESSIN: LACK OF A ROLE FOR ADENOSINE-3',5'-CYCLIC MONOPHOSPHATE. *(E.)* Kirk, C. J.; Hems, D. A. (Dept. Biochem., Imperial Coll. Sci. Technol., London, England). *FEBS Lett.* 47(1):128-131, 1974.

The effect of vasopressin on hepatocyte cyclic AMP levels was studied *in vivo* and *in vitro*. Cyclic AMP levels were measured by a radioisotope saturation assay in rat livers during a 30 min perfusion with a solution containing albumin, washed rat RBC, and glucagon (10 ng/ml), adrenalin (10^{-6} M) or vasopressin (100 mU/liter), and in acid insoluble extracts of livers from intact rats injected *via* the portal vein with glucagon (1.0 µg), adrenalin (1.5 X 10^{-8}M), or vasopressin (10 or 100 mU). In both intact rats and perfused liver, vasopressin failed to increase intracellular hepatocyte cyclic AMP concentration although in perfused liver it did cause increased glucose output of the same order of magnitude as that produced by adrenalin. In both systems, adrenalin and glucagon produced an increase in cyclic AMP. These results confirm the results of previous studies. The glycogenolytic action of vasopressin on the liver thus appears to be unique among hormones with short-term "catabolic" effects in that it is associated with no discernible alteration in tissue cyclic AMP concentration.

8327 INTERACTIONS OF PROSTAGLANDINS WITH HEPATIC MICROSOMAL CYTOCHROME P-450. *(E.)* Kupfer, D. (Worcester Fdn. Exp. Biol., Shrewsbury, Mass.). *Life Sci.* 15(4):657-670, 1974.

Studies were conducted to determine whether prostaglandins interact with the hepatic cytochrome P-450 system. To this end, the spectral changes associated with the addition of prostaglandins to hepatic microsome preparations from guinea pigs and rats were examined. Prostaglandins A_1, A_2, E_1, E_2, $F_{1\alpha}$ and $F_{2\alpha}$, when added to guinea pig liver microsomes, exhibited type I spectra (a trough at 420 nm and a peak at about 385 nm). The binding affinities as determined from spectral dissociation constants were highest with prostaglandins A_1 and A_2. With liver microsomes from control or 3-methylcholanthrene-treated rats, prostaglandins did not yield type I spectra; however, in this case a weak spectrum, designated as type "II" (λ_{max} at 415-425 nm and a weak but occasionally absent λ_{min} at 390-400 nm) was at times observed. With microsomes from phenobarbital-treated rats only prostaglandins A_1 and A_2 yielded type I spectra; again in absence of type I spectrum, a weak type "II" was occasionally observed. The addition of prostaglandins A_1 and A_2 to liver microsomes from phenobarbital-treated rats inhibited the microsomal mediated hydroxylation of hexobarbital. The inhibition by prostaglandin A_1 was competitive; the inhibitory constant (8.2 X 10^{-4} M) was found to be similiar in magnitude to the dissociation constant (7.3 X 10^{-4} M) of prostaglandin A_1 observed with rat liver microsomes. These observations suggested that prostaglandins, particularly of the A series, interact with the hepatic microsomal cytochrome P-450 monoxygenase system.

8328 THYROID HORMONE ACTION. IN VITRO CHARACTERIZATION OF SOLUBILIZED NUCLEAR RECEPTORS FROM RAT LIVER AND CULTURED GH_1 CELLS. *(E.)* Samuels, Jr., H. H.; Tsai, J. S.; Casanova, J.; Stanley, F. (New York Univ. Med. Ctr., N.Y.). *J. Clin. Invest.* 54(4):853-865, 1974.

The kinetics of *in vitro* binding of ^{125}I-triiodothyronine and ^{125}I-thyroxine with GH_1 cells (a rat pituitary tumor cell line) and rat liver nuclear extract was examined at 0 C and 37 C. Equilibrium was attained within 5 min at 37 C and 2 hr at 0 C. The binding activity from GH_1 cells was stable for at least 1 hr at 37 C and 10 days at -20 C. Chromatography on a weak carboxylic acid column and inactivation by trypsin and pronase, but not by DNase or RNase, suggested that the putative receptor was a nonhistone protein. The estimated equilibrium dissociation constants for hormone binding to the solubilized nuclear binding activity were 1.80 X 10^{-10} M (triiodothyronine) and 1.20 X 10^{-9} (thyroxine) for GH_1 cells and 1.57 X 10^{-10} M (triiodothyronine) and 2.0 X 10^{-9} M (thyroxine) for rat liver. These values for triiodothyronine are virtually identical to those previously reported with isolated rat liver nuclei and GH_1 cell nuclei *in vitro*. The 10-fold greater affinity for triiodothyronine compared with thyroxine in the nuclear extract is also identical to that observed with intact GH_1 cells. In addition, the ^{125}I-triiodothyronine and ^{125}I-thyroxine high-affinity binding in the nuclear extract were inhibited by nonradioactive triiodothyronine or thyroxine, which suggests that the binding activity in the nuclear extract was identical.

8329 TIME-COURSE OF THE EFFECTS OF THYROID HORMONE ON RESPIRATION AND Na^+ + K^+-ATPase ACTIVITY IN RAT LIVER. *(E.)* Ismail-Beigi, F.; Edelman, I. S. (Univ. California Sch. Med., San Francisco). *Proc. Soc. Exp. Biol. Med.* 146(4):983-988, 1974.

As a test of the hypothesis that increased energy expenditure in active Na^+ transport mediates a major part of thyroid thermogenesis, time-course measurements were made of hepatic oxygen consumption (Q_{O2}), Na^+-dependent oxygen consumption [Q_{O2}(t)], and Na^+ + K^+ adenosine-triphosphatase (NaK-ATPase) activity after a single or repeated injections of triiodothyronine (50 μg/100 g) into thyroidectomized and euthyroid male Sprague-Dawley rats. In both groups, after single injections, Q_{O2} and Q_{O2}(t) increased to peak values at 48 hr and declined in parallel to close to the control level by the 6th day. In euthyroid rats, NaK-ATPase activity manifested the same time-course with a peak increase at 48 hr. In both groups, after repeated injections (every other day X 3), there were curvilinear increases in Q_{O2}, Q_{O2}(t) and NaK-ATPase activity to steady-state levels in 2-3 days. These findings are in accord with the inference that thyroidal stimulation of the Na^+ pump mediates the increase in Q_{O2}(t). In addition, it was found that there was an increase in Na^+-independent respiration and Mg-ATPase activity with a peak response at 48 hr in hypothyroid rats; this effect was transient even with repeated injections of triiodothyronine.

8330 ETHANOL OXIDATION BY COMPONENTS OF RAT LIVER MICROSOMES. *(E.)* Barakat, H. A.; Tapscott, E.; Pennington, S. (East Carolina Univ. Sch. Med., Greenville, N.C.). *Biochem. Biophys. Res. Commun.* 60(1):482-488, 1974.

Cytochrome P-450 was obtained from rat liver microsomes by a new purification method to determine whether the cytochrome alone and in combination with other fractions is involved in the oxidation of ethanol. Microsomal pellets from male albino Sprague-Dawley rats were solubilized in a solution consisting of 110 mM sucrose, 20 mM potassium chloride, 20 mM sodium citrate at pH 7.5, 1.25 mM DTT, 20% glycerol, and 0.5% deoxycholate. After stirring of the pellet in the solubilization buffer and centrifuging, the resultant supernatant solution was applied to a DEAE-cellulose column which was then washed with potassium phosphate buffer until the A_{280} of the eluate dropped to approximately 0.150. Cytochrome P-450 was then eluted with a linear 0.1 M-0.3 M potassium phosphate gradient. Fractions with a high P-450 specific activity were pooled and concentrated through a PM-10 Amicon filtration membrane, with the concentrate being applied to a Sephadex G-200 column and eluted with 0.4 M potassium phosphate buffer. Although 15% of the original P-450 was recovered through the purification process, only 0.8% of the total original microsomal ethanol oxidation activity was associated with this fraction. Addition of this purified fraction to other fractions isolated did not further stimulate ethanol oxidation. The component of rat liver microsomes that was most efficient in the oxidation of ethanol was the mixture of catalase and NADPH-cytochrome-c-reductase. The highly purified cytochrome P-450 did not by itself oxidize ethanol to any appreciable degree.

8331 NADPH-DEPENDENT OXIDATION OF METHANOL, ETHANOL, PROPANOL AND BUTANOL BY HEPATIC MICROSOMES. *(E.)* Teschke, R.; Hasumura, Y.; Lieber, C. S. (Bronx VA Hosp., New York, N.Y.). *Biochem. Biophys. Res. Commun.* 60(2):851-857, 1974.

The oxidation of methanol, ethanol, propanol, and butanol to their respective aldehydes was studied in a rat liver microsomal preparation in the presence of an NADPH regenerating system. All 4 alcohols were metabolized under these conditions; however, no aldehydes were produced from propanol and butanol in the presence of a peroxide (H_2O_2) generating system, whereas methanol and ethanol were oxidized also under these conditions. Controlled studies of the effect of chronic ethanol consumption on the microsomal alcohol oxidizing system of rat liver showed a 50-100% stimulation of specific activity depending on which of the 4 alcohol substrates was used. Pyrazole (0.1 mM), an alcohol dehydrogenase inhibitor, had no effect on microsomal alcohol oxidizing system activity, whereas alcohol oxidation was significantly inhibited by CO. These results indicate that the microsomal oxidizing system operates separately from catalase and from alcohol dehydrogenase and that it is responsible, at least partially, for the alcohol metabolism by the alcohol dehydrogenase-independent pathway of the liver.

8332 2,4-DINITROPHENOL-INDUCED INCREASE IN ETHANOL AND ACETALDEHYDE OXIDATION IN THE PERFUSED RAT LIVER. *(E.)* Eriksson, C. J. P.; Lindros, K. O.; Forsander, O. A. (Res. Lab. State Alcohol Monopoly, Helsinki, Finland). *Biochem. Pharmacol.* 23(15):2193-2195, 1974.

The mechanism of the 2,4-dinitrophenol (DNP)-induced stimulation of ethanol metabolism was examined using a once-through liver perfusion system so that the oxidation of both ethanol and the acetaldehyde derived from it, the cytosolic redox state, and oxygen consumption could all be determined in the same liver. Livers were used from male albino Wistar rats. In preliminary studies, 0.01, 0.02, and 0.05 mM DNP were passed consecutively through the same liver. Essentially the same effects were observed with each DNP concentration. There was a marked increase in both the ethanol and the acetaldehyde oxidation rate in the presence of DNP. Ethanol increased both oxygen consumption and the lactate/pyruvate ratio in the perfusion medium; DNP further stimulated oxygen uptake but lowered the lactate-pyruvate ratio. Although the increase in acetaldehyde and ethanol oxidation rates appears similar, the decreased acetaldehyde output during DNP infusion shows that the oxidation of acetaldehyde increased more than that of ethanol. This somewhat stronger stimulation of acetaldehyde oxidation supports at least partial intramitochondrial acetaldehyde oxidation.

8333 IN VITRO INHIBITION OF PROTEIN SYNTHESIS IN RAT LIVER AS A CONSEQUENCE OF ETHANOL METABOLISM. *(E.)* Perin, A.; Scalabrino, G.; Sessa, A.; Arnaboldi, A. (Inst. Gen. Pathol., Univ. Milan, Italy). *Biochim. Biophys. Acta* 366(1):101-108, 1974.

Hepatocyte protein synthesis was studied *in vitro* by measuring the rate of incorporation of isotopically labeled amino acids into acid-insoluble material of rat liver slices during incubation in ethanol (0.5 - 150 mM). Ethanol showed a dose-dependent inhibitory effect on protein synthesis which was most evident when radioactive leucine was used as a marker, reaching a maximum of 46% at 150 mM in fed rats compared to the uptake in controls. Removal of ethanol reversed the inhibition which was nearly twice as great in fed as in fasting rats. Pyrazole (2 mM), an alcohol dehydrogenase inhibitor, also prevented the protein inhibitory effect of ethanol. Concentrations of ethanol which were inhibitory in rat liver failed to inhibit protein synthesis in liver slices from guinea pigs which lack alcohol dehydrogenase. Acetaldehyde, the primary metabolite of ethanol, however, did inhibit guinea pig liver protein synthesis suggesting that ethanol metabolism is a necessary prerequisite. Acetaldehyde (10^{-4}M), but not acetoin (up to 5 mM), also inhibited rat liver protein synthesis. Sorbitol, which like ethanol decreases the NAD/NADH ratio in hepatocytes, inhibited rat liver protein synthesis while pyruvate (10 mM), which raises the NAD/NADH ratio was able to reverse the ethanol effect. These data show that the inhibition of rat liver protein synthesis by ethanol is a consequence of ethanol metabolism to acetaldehyde and is due also to a shifting of the redox potential of the cell.

8334 CHANGES IN MICROSOMAL AND MITOCHONDRIAL OXIDATION IN RAT LIVER DURING CONTINUOUS ADMINISTRATION OF PHENOBARBITOL. *(Rus.)* Chistiakov, V. V; Chernobrovkina, T. V.; Ratnikova, L. A.; Pospelova, L. I. (N. I. Pirogov 2nd Moscow Med. Inst., USSR). *Biokhimiia* 39(5):984-990, 1974.

White male rats were injected i.p. with phenobarbital (80 mg/kg/day for 20 days) to study the changes in the oxidative systems of microsomes and mitochondria. Cytochrome P-450 content and enzyme activity in the NADPH oxidation pathways in microsomes increased by 3.6 and 2.5 times normal, resp., 4 days after administration of the drug. Continued injection showed a decrease approaching the control level. Similar but less pronounced changes were observed in the microsomal NADH oxidation pathways. Increased activity in mitochondrial NADH oxidation was noted 2-3 days after the injection began, followed by a slight decrease in the next few days. The cytochrome b_5 content in mitochondria increased sharply in 6 days by the time tolerance to the drug hypnotic effect set in, and remained 2.5 times above normal in the subsequent period of phenobarbital administration. Comparison of the changes in the oxidative enzymes of hepatic microsomes and mitochondria suggests the involvement of the mitochondrial cytochrome b_5 in the "stand-by" oxidative system responsible for the phenobarbital detoxication in the continuous administration of the drug.

8335 HEPATIC AND SERUM LIPID PATTERNS DURING DEVELOPMENT OF PHENOBARBITAL INDUCED FATTY LIVERS IN RATS. *(E.)* Tuma, D. J.; Sorrell, M. F.; Barak, A. J. (VA Hosp., Omaha, Nebr.). *Proc. Soc. Exp. Biol. Med.* 146(4):953-956, 1974.

Lipids were measured in the livers and sera of male Sprague-Dawley rats weighing 250 g that had received phenobarbital injections (50 mg/kg sodium phenobarbital i.p. every 12 hr) for 3 days and 5 days. The same lipid patterns, including free cholesterol, cholesterol esters, phospholipids, triglyceride, and fatty acids, were determined in the livers and sera of rats 3 days and 5 days following withdrawal of the drug. Liver lipids increased with time while the drug was being administered and returned to normal when the drug was withdrawn. During phenobarbital administration as well as during withdrawal, the serum lipid levels did not change. These results suggest that decreased lipid transport and increased peripheral mobilization of fat do not play a major role in the pathogenesis of phenobarbital induced fatty liver.

8336 ACETAMINOPHEN-INDUCED HEPATIC INJURY: PROTECTIVE ROLE OF GLUTATHIONE IN MAN AND RATIONALE FOR THERAPY. *(E.)* Mitchell, J. R.; Thorgeirsson, S. S.; Potter, W. Z.; Jollow, D. J.; Keiser, H. (Natl. Heart Lung Inst., Bethesda, Md.). *Clin. Pharmacol. Ther.* 16(4):676-684, 1974.

The metabolism of acetaminophen (900, 1200, or 1800 mg administered p.o. at 48 hr intervals) was studied in 12 healthy male and female human volunteers. Chromatographic analysis of urinary metabolites in 2 subjects who had ingested ^{3}H-acetaminophen (1200 mg) indicated that 84% of the administered dose was excreted in 12 hr. Of the total urinary radioactivity, 2.1% was associated with free acetaminophen, 52.1% and 42.0% with the parahydroxy sulfate and glucuronide conjugates, resp., and 3.8% with the mercapturic acid conjugate. In 10 other subjects who ingested unlabeled acetaminophen, the formation of acetaminophen-mercapturic acid was proportional to the dose of the drug. In parallel animal studies, pretreatment with cysteamine (150 mg/kg) and dimercaprol (80 mg/kg), protected mice from acetaminophen-induced hepatic necrosis. Treatment with cysteamine within 1 hr after acetaminophen ingestion reduced the mortality rate and severity of hepatic necrosis. Cysteamine, however, had no protective effect if given 2 or 3 hr after acetaminophen. Pretreatment with cysteamine failed to alter the rate of acetaminophen absorption or metabolism in mice. *In vitro* studies showed that cysteamine decreased the cytochrome P-450-dependent arylation by acetaminophen of hepatic microsomal proteins but had no effect on the metabolism of ethylmorphine, another substrate of the cytochrome P-450 system; this finding suggested that cysteamine acted by combining directly with the electrophilic metabolite of acetaminophen. These results suggest that patients overdosed with acetaminophen may logically be treated with cysteamine or similar compounds.

8337 REGULATION OF GLUCOSAMINE SYNTHESIS DURING THE FIRST TWENTY-FOUR HOURS FOLLOWING INJURY AND PARTIAL HEPATECTOMY. *(E.)* Okubo, H.; Chandler, A. M. (Univ. Oklahoma Sch. Med., Oklahoma City). *Proc. Soc. Exp. Biol. Med.* 146(4):1159-1162, 1974.

The activity of glucosamine synthetase and the concentration of uridine diphospho-*N*-acetylhexosamine (UDPAH) were measured concomitantly during the first 24 hr following laparotomy or partial hepatectomy in male albino rats weighing 150-250 g. Glucosamine synthetase activity increased significantly above normal by 12 hr following laparotomy, rose rapidly to peak values of 60-100% above normal by 18 hr, and then declined at variable rates. UDPAH concentrations rose and fell in parallel with the fluctuations in enzyme activity. Glucosamine synthetase activity showed little or no response after partial hepatectomy until about 20-24 hr when variable rates of increase occurred. The UDPAH concentrations remained constant until 14-18 hr after which a significant decrease occurred.

8338 EFFECT OF DRUG PRETREATMENT ON $CBrCl_3$-INDUCED IVER INJURY. *(E.)* Torielli, M. V.; Ugazio, G.; Gabriel, L.; Burdino, E. (Inst. Gen. Pathol., Univ. Turin, Italy). *Toxicology* 2(4):321-326, 1974.

The effects on $CBrCl_3$-induced liver toxicity of 2-diethylaminoethyl-2,2-diphenylvalerate (SKF-525A), an inhibitor of microsomal mixed-function oxidases, and of *N,N'*-diphenyl-*p*-phenylenediamine (DPPD), a mixed-function oxidase inhibitor with antioxidant properties, were studied in fasting male Wistar rats pretreated with phenobarbital. The marked double-bond shifting in purified liver microsomal lipids as determined by a shift in the UV absorption spectrum and observed 60 min after intragastric administration of 10 µl $CBrCl_3$/100 g was enhanced 50% by phenobarbital pretreatment (total of 18 mg/100 g i.p.). Pretreatment with SKF-525A (5 mg/100 g i.p.) or DPPD (60 mg/100 g i.p.), however, lowered the $CBrCl_3$-induced peroxidative decomposition of unsaturated lipids. Fatty liver, as determined by the rate of hepatic triglyceride accumulation, was significantly enhanced in phenobarbital-pretreated rats but was almost completely prevented by SKF-525A and DPPD. Prior treatment with small doses of CCl_4(25 µl/100 g p.o.) partially protected animals against the lethal effect of $CBrCl_3$. These results suggest that the lethal effect of $CBrCl_3$ depends on the efficiency of the hepatic microsomal drug-metabolizing enzyme systems.

8339 EFFECT OF LIGATION OF THE HEPATIC ARTERY OR OCCLUSION OF THE PORTAL VEIN ON THE DEVELOPMENT OF ENDOTOXEMIA. *(E.)* Gans, H. (no affil.). *Surg. Gynecol. Obstet.* 139(5):689-692, 1974.

Twenty-three male Sprague-Dawley rats were given tetracycline (2.5 mg) 10-15 min after undergoing hepatic artery ligation. Every rat survived and continued to thrive. A similar group of 23 rats receiving lead acetate (3 1/2 mg/100 g i.v.) 15-20 min after ligation also survived. Thirteen of 15 rats subjected to the same procedure but without the tetracycline protection died after lead acetate administration. Portal vein occlusion for 30 min was well tolerated in 6 rats receiving single doses of 0.05 ml heparin preoperatively and 2.5 mg tetracycline i.m. postoperatively. Upon release of the portal vein occlusion, the congested intestine slowly resumed normal color over the course of 2-10 min, while the liver quickly resumed its normal color. All rats survived lead acetate injection. When this study was repeated without heparin or tetracycline protection, all 10 rats submitted to tourniquet occlusion of the portal vein for 30 min tolerated administration of lead acetate. There was no evidence to suggest the development of systemic endotoxemia after hepatic artery ligation or after 30 min of portal venous occlusion. The findings suggest that in the rat during a 30-min interruption of portal vein blood flow, the hepatic artery flow is quite sufficient to maintain life and sustain subsequent growth.

8340 FATTY LIVERS INDUCTION BY OROTIC ACID CONTAINED IN SKIM MILK POWDER. *(E.)* Okonkwo, P. O.; Kinsella, J. E. (Fac. Med., Univ. Nigeria, Enugu). *Experientia* 30(9):993-994, 1974.

Thirty female Sprague-Dawley rats, weighing 155 to 165 g, were divided into 3 groups of 10 each and fed a control diet, the control diet plus 0.15% orotic acid, and a skim milk powder diet containing 0.15% orotic acid, resp. The 3 diets were isocaloric and contained the identical casein protein content. Five rats were sacrificed from each group after 3 and 8 days, the livers removed, the amount of lipid determined, and the lipid content analyzed for component fatty acids by gas-liquid chromatography. There was a marked increase in total lipid content of the liver which increased progressively with orotic acid feeding. Steatosis was visible in orotic acid-treated rats. The low concentration of orotic acid used, combined with the use of mature rats might account for the lack of drug-induced hepatic hypertrophy observed in previous studies. The presence of calcium and lactose in the powdered milk did not protect against fatty liver.

8341 BILIARY EXCRETION AND ENTEROHEPATIC CIRCULATION OF [^{14}C]HYDROXYTRYPTAMINE IN NORMAL AND CIRRHOTIC RATS. *(E.)* Kekki, M.; Pentikainen, P.; Mustala, O. (Dept. Pharmacol., Univ. Helsinki, Finland). *Gastroenterology* 67(4):700-708, 1974.

^{14}C-Serotonin (11 μg/kg) was administered intraportally to normal and cirrhotic male Sprague-Dawley rats, and urine and bile were collected periodically for periods up to 6, and occasionally up to 10 hr. ^{14}C-Serotonin metabolites were separated using 2-dimensional paper chromatography, and the radioactivity of 9 metabolites of serotonin was measured by liquid scintillation spectroscopy. Cirrhotic rats excreted ^{14}C metabolites into urine in less quantity than did normal rats. In addition, the biliary excretion of labeled metabolites was markedly depressed in cirrhotic rats. The preferential occurrence of glucuronide conjugates was demonstrated in both the urine and bile of cirrhotic animals. ^{14}C-5-Hydroxytryptophol conjugates decreased and ^{14}C-serotonin conjugates increased in cirrhotic rats. In normal animals, at least 1/3 of the ^{14}C-serotonin metabolites excreted into the bile go through the enterohepatic circulation, and a significant proportion of these can be found again in bile after intrajejunal administration of prelabeled bile.

8342 DRUG METABOLISM IN EXPERIMENTAL CHOLESTASIS. *(Ger.)* Richter, E.; Grun, M.; Zilly, W.; Brachtel, D.; Kuhn, H. A. (Med. Clin., Univ. Wurzburg, Germany). *Verh. Dtsch. Ges. Inn. Med.* 78:1402-1404, 1972.

Cholestasis was induced in albino rats (FW 49 strain) by administration of 100 mg/kg of α-naphthylisothiocyanate (ANIT) p.o. In the livers of these rats, NADPH-cytochrome *c* reductase activities and cytochrome P-450 contents were almost normal, but the duration of hexobarbital sleep was increased and the maximum hexobarbital tolerance was decreased. If rats were pretreated with phenobarbital (50-80 mg/kg i.p. in increasing doses on 4 successive days) before administration of ANIT, drug-metabolizing enzymes in the liver were activated with increases in the cytochrome P-450 content and NADPH-cytochrome *c* reductase activities. The duration of hexobarbital sleep was reduced and maximum hexobarbital tolerance was increased. However, phenobarbital pretreatment increased the severity of ANIT-induced cholestasis, as determined by clinical, chemical, and morphological investigations. ANIT-induced cholestasis produced functional impairment of drug metabolism which was eliminated by phenobarbital pretreatment. On the basis of these results, the drug-metabolizing enzymes do not appear to be involved in the development of cholestasis.

8343 SURGICAL RESEARCH ASPECTS OF HEPATIC REGENERATION. *(E.)* Hays, D. M. (Univ. Southern California Sch. Med., Los Angeles). *Surg. Gynecol. Obstet.* 139(4):609-619, 1974.

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8345 STUDIES ON THE STRUCTURE AND FUNCTION OF RIBOSOMES FROM REGENERATING RAT LIVER. *(E.)* Scheinbuks, J.; Sypherd, P. S.; Moldave, K. (California Coll. Med., Univ. California, Irvine). *Biochem. Biophys. Res. Commun.* 61(1):322-328, 1974.

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8347 A STUDY OF RESPIRATION AND OXIDATIVE PHOSPHORYLATION OF MITOCHONDRIA FROM REGENERATING LIVER OF NORMAL AND DIABETIC RATS. *(E.)* Choi, S. C.; Hall, J. C. (Dept. Zool., Rutgers State Univ., Newark, N.J.). *Cancer Res.* 34:2351-2357, 1974.

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8349 DIFFERENCE SPECTRA, CATALASE- AND PEROXIDASE ACTIVITIES OF ISOLATED PARENCHYMAL AND NON-PARENCHYMAL CELLS FROM RAT LIVER. *(E.)* van Berkel, T. J. C. (Fac. Med., Erasmus Univ., Rotterdam, Netherlands). *Biochem. Biophys. Res. Commun.* 61(1):204-209, 1974.

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8354 SUBCELLULAR DISTRIBUTION AND PROPERTIES OF KYNURENINE TRANSAMINASE IN RAT LIVER. *(E.)* Nakatani, M.; Morimoto, M.; Noguchi, T.; Kido, R. (Wakayama Med. Coll., Japan). *Biochem. J.* 143(2): 303-310, 1974.

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8356 PROTEIN-PREDNISOLONE INTERACTION IN THE REGULATION OF THE ACTIVITY OF SOME LIVER AND KIDNEY ENZYMES IN GROWTH-PLATEAUED RATS. *(E.)* Nath, N.; Bedi, G. S.; Bhandari, P. K. (Dept. Biochem., Panjab Univ., Chandigarh, India). *Enzyme* 17(5):287-296, 1974.

8357 THE EFFECTS OF CATECHOLAMINES, GLUCAGON, AND DIET ON ENZYME ACTIVITIES IN BROWN FAT AND LIVER OF THE RAT. *(E.)* Hahn, P.; Kirby, L. T. (Dept. Pediatr., Univ. British Columbia, Vancouver, Canada). *Can. J. Biochem.* 52(9):739-743, 1974.

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8365 STUDIES ON THE PRODUCTION OF FATTY LIVER INDUCED BY ETHANOL. *(E.)* Bustos, G. A. (Univ. Toronto, Canada). *Diss. Abstr. Int. B* 35(2): 965, 1974.

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8371 LIPID METABOLISM IN LIVER AND BRAIN IN ACUTE HYPERPHENYLALANINEMIA IN RATS OF DIFFERENT AGES. CORRELATION WITH TISSUE PHENYLALANINE AND TYROSINE LEVELS. *(E.)* Geison, R. L.; Josephson, L. (Univ. Wisconsin Ctr. Health Sci., Madison). *Biol. Neonate* 24(3-4):161-186, 1974.

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8376 ALTERATION BY PHENOBARBITAL OR 3-METHYLCHOLANTHRENE PRETREATMENT OF FUNCTIONAL AND STRUCTURAL CHANGES IN RAT LIVER DUE TO CARBON TETRACHLORIDE INHALATION *(E.)* Sharh, H. C. (Univ. Rhode Island, Providence). *Diss. Abstr. Int. B* 35(2):967B-968B, 1974.

8377 EFFECTS OF DPPD ON THE DRUG METABOLISING ENZYME SYSTEM OF RAT LIVER. *(E.)* Gabvriel, L.; Torrielli, M. V.; Ugazio, G.; Burdino, E. (Inst. Gen. Pathol., Univ. Turin, Italy). *Rend. Gastroenterol.* 5(3):213, 1973.

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8381 PERFUSION OF ISOLATED LIVER COMBINED WITH HAEMODIALYSIS IN THE TREATMENT OF HEPATIC COMA. *(E.)* Casciani, C.; Cortesini, R.; Ancarani, E.; Boffo, V.; Taccone, M. (Surg. Clin. II, Univ. Rome, Italy). *Rend. Gastroenterol.* 5(3):225-226, 1973.

8382 A TECHNIQUE OF LIVER TRANSPLANTATION IN THE PIG. *(E.)* Guiney, E. J.; O'Connor, J. B.; Fernando, A.; Healy, B.; Michaelowich, B.; Cahill, C.; Walsh, M. (Our Lady's Hosp. Sick Children, Dublin, Ireland). *Ir. J. Med. Sci.* 143(5):225-263, 1974.

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8386 BILIARY EXCRETION OF PHENYL- AND METHYL MERCURY CHLORIDES AND THEIR ENTEROHEPATIC CIRCULATION IN RATS. *(E.)* Cikrt, M.; Tichy, M. (Inst. Hyg. Epidemiol., Prague, Czechoslovakia). *Environ. Res.* 8(1):71-87, 1974.

8387 KINETICS OF BILT SALT UPTAKE BY THE PERFUSED RAT LIVER. *(E.)* Reichen, J.; Paumgartner, G. (Dept. Clin. Pharmacol., Berne, Switzerland). *Eur. J. Clin Invest.* 4(5):325, 1974.

8388 THE ROLE OF THE INTRAMURAL COMMON BILE DUCT IN THE FILLING OF THE CANINE GALLBLADDER. *(E.)* Tansy, M. F.; Innes, D. L.; Martin, J. S.; Kendall, F. M. (Temple Univ. Sch. Dent., Philadelphia, Pa.). *Surg. Gynecol. Obstet.* 139(4):585-592, 1974.

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8393 BILE SECRETION DURING INGESTION AND INTRADUODENAL ADMINISTRATION OF FOODS AS RELATED TO PERIODIC CHANGES IN GASTROINTESTINAL FUNCTION. *(Rus.)* Soloviev, N. A. (I. P. Pavlov Inst. Physiol., Leningrad, USSR). *Fiziol. Zh. SSSR* 60(9): 1454-1462, 1974.

8394 EFFECT OF ACUTE MASSIVE BLEEDING IN HYPERBARIC OXYGEN TREATMENT ON NUCLEIC ACID METABOLISM IN ALBINO RAT LIVER. *(Rus.)* Tirtishnikov, I. M. (Voronezh Med. Inst., USSR). *Biull. Eksp. Biol. Med.* 77(6):23-25, 1974.

8395 DECOMPOSITION OF RIBOSMAL RNA IN RAT LIVER AND ITS REUTILIZATION. *(Rus.)* Gorbach, Z. V.; Kriuchkova, V. T. (Dept. Regul. Metabol., Acad. Sci. Belorussian, SSR). *Biokhimiia* 39(5):1021-1023, 1974.

See also, 8159, 8160, 8189, 8200, 8202, 8203, 8204, 8254, 8260, 8261, 8297, 8417, 8806, 8815.

SECRETION AND METABOLISM

Intestine

8396 ENTEROCHROMAFFIN CELLS OF THE MAMMALIAN SMALL INTESTINE AS THE SOURCE OF MOTILIN. *(E.)* Pearse, A. G. E.; Polak, J. M.; Bloom, S. R.; Adams, C.; Dryburgh, J. R.; Brown, J. C. (Hammersmith Hosp., London, England). *Virchows Arch.* [*Zellpathol.*] 16(2):111-120, 1974.

The 22-amino acid peptide motilin was found in the enterochromaffin cells (EC) of the duodenum and jejunum by immunofluorescence and electron microscopy. Samples of mucosa were taken from the stomach, mid and lower duodenum, upper and lower jejunum, upper and lower ileum, and upper and lower colon of 2 dogs, 2 young pigs, and 1 baboon, and a further series of samples from 5 human subjects at operation. Fluorescent motilin cells were detected in the mucosa of all species tested. In the duodenum and jejunum, no argentaffin cell was found which did not contain motilin. In the stomach and colon, on the other hand, no motilin immunofluorescence was found in the EC cells or elsewhere. Early speculation that the protein present in the 5-hydroxytryptamine-storing granules of the EC cell would be found to be a polypeptide hormone are thus confirmed.

8397 THYROXINE-EVOKED PRECOCIOUS DECREASE OF ACID HYDROLASES IN THE ILEUM OF SUCKLING RATS. *(E.)* Koldovsky, O.; Jumawan, J.; Palmieri, M. (Children's Hosp., Philadelphia, Pa.). *Proc. Soc. Exp. Biol. Med.* 146(3):661-664, 1974.

The involvement of the thyroid in the maturation of the small intestine was studied in Charles River rats. Thyroxine (200 μg/100 g, s.c.) was administered every 24 hr to intact suckling rats (from day 7 to 13 of age) and to suckling adrenalectomized rats (from day 14 to 18 of age). Thyroxine-treated intact animals gained less weight than control rats, their fur appeared more mature, and their eyes opened sooner. Thyroxine did not influence the body weight of adrenalectomized rats, but it did cause a decrease in the weight of the ileum expressed both as total mg of protein and as total mg wet weight. Thyroxine evoked a substantial decrease of activity of acid-β-galactosidase, N-acetyl-β-glucosaminidase and β-glucuronidase in the ileum of suckling rats from both groups. Thus, the decrease in acid hydrolase activity was not secondary to stimulation of the adrenals. Thyroxine also evoked a precocious increase of jejunal sucrase and maltase activities in suckling rats. These results support the maturative role of the thyroid in the development of the small intestine.

8398 ACTION OF Escherichia coli ENTEROTOXIN: ADENYLATE CYCLASE BEHAVIOR OF INTESTINAL EPITHELIAL CELLS IN CULTURE. *(E.)* Kantor, H. S.;

Tao, P.; Wisdom, C. (Hektoen Inst. Med. Res., Chicago, Ill.). *Infect. Immun.* 9(6):1003-1010, 1974.

Enterotoxin response of human embryonic epithelial cells in culture was compared to that in the adult rabbit ileal loop model. Heat-labile enterotoxin preparations obtained from 2 enteropathogenic strains of *Escherichia coli* of porcine and human origin were shown to stimulate adenylate cyclase activity of human embryonic intestinal epithelial cells in culture. Comparable results were also obtained when *Vibrio cholera* enterotoxin was used. In general, degree of enzyme stimulation was proportional to the concentration of enterotoxin. Similar preparations from 2 strains of non-enterotoxigenic *E. coli* had no effect on adenylate cyclase activity. During long periods (18 hr) of tissue culture incubation, the determination of adenylate cyclase activity was 200-300 times more sensitive than quantitating fluid accumulation in the adult rabbit ileal loop models. Decreasing the incubation time appreciably reduced the sensitivity of the epithelial cells to enterotoxin. It was also found that *E. coli* enterotoxin was an effective activator of nonintestinal adenylate cyclase systems. Treatment of 2 other cell lines, a human epitheloid carcinoma and a human carcinoma of the larynx, with enterotoxin also resulted in significant enzyme stimulation. Results obtained here indicate that the intestinal epithelial cell tissue culture model provides a sensitive homogenous biological system for studying the response of intestinal adenylate cyclase to enterotoxin while eliminating the numerous cellular and tissue components present in the ligated ileal loop model.

8399 CELLS INVOLVED IN THE IMMUNE RESPONSE. XXVII. THE DEMONSTRATION OF APPENDIX-SPECIFIC ANTIGENS IN THE RABBIT. *(E.)* Colas de la Noue, H.; Richter, M. (Roy. Victoria Hosp., Montreal, Canada). *Immunology* 27(3):421-426, 1974.

The existence of appendix lymphocyte-specific antigens in the rabbit was investigated. Rabbit appendix cells were injected i.v. into horses at weekly intervals after which the horses were bled and the sera tested for cytotoxic activity. The unabsorbed antiserum was cytotoxic to the lymphocytes of all the lymphoid organs tested. Following absorption with bone marrow and thymus cells, the antiserum lost all cytotoxic activity directed toward these cells but displayed almost undiminished cytotoxic activity toward the cells of the saculus rotundus, appendix and Peyer's patches. The absorbed antiserum also demonstrated cytotoxic activity toward certain lymphocytes present in the spleen, lymph node and circulation. Thus, the antibodies directed toward the antigens common to all lymphoid cells were removed by the thymus and bone marrow cells, leaving behind cytotoxic antibodies directed toward antigens present on appendix and appendix-derived cells only. The results suggest that less than 50% of the spleen and circulating cells and about 60% of the lymph node lymphocytes are appendix-derived cells or cells which carry the appendix lymphocyte-specific antigen markers.

8400 THE INFLUENCE OF THE GUT MICROFLORA ON THE DIGESTION OF DIETARY AND ENDOGENOUS PROTEINS: STUDIES OF THE AMINO ACID COMPOSITION OF THE EXCRETA OF GERM-FREE AND CONVENTIONAL CHICKS. *(E.)* Salter, D. N.; Fulford, R. J. (Natl. Inst. Res. Dairying, Reading, England). *Br. J. Nutr.* 32(3):625-637, 1974.

8401 A DIRECT TEST FOR MONO-OXYGENASE ACTIVITY OF INTACT SMALL INTESTINE USING SURFACE REFLECTANCE FLUORIMETRY. *(E.)* Ullrich, V.; Weber, P. (Dept. Theoretical Med., Univ. Saarland, Homburg/Saar, Germany). *Biochem. Pharmacol.* 23(23): 3309-3315, 1974.

8402 SECRETIN-LIKE ACTIVITY IN SUBCELLULAR FRACTIONS OF CHICKEN INTESTINAL MUCOSA. *(E.)* Fiddes, I. J. S.; Trotman, C. N. A. (Med. Sch., Univ. Newcastle upon Tyne, England). *J. Endocrinol.* 63(1):239-245, 1974.

8403 IN VITRO INDUCTION BY PHENOBARBITAL OF DRUG MONOOXYGENASE ACTIVITY IN MOUSE ISOLATED SMALL INTESTINE. *(E.)* Scharf, R.; Ullrich V. (Dept. Theorectical Med., Univ. Saarland, Homburg/Saar, Germany). *Biochem. Pharmacol.* 23(15):2127-2137, 1974.

8404 THE MODULATING EFFECT OF CHOLERA ENTEROTOXIN ON THE IMMUNE RESPONSE. *(E.)* Chisari, F. V.; Northrup, R. S.; Chen, L. C. (Natl. Inst. Allergy Infect. Dis., Bethesda, Md.). *J. Immunol.* 113(3):729-739, 1974.

8405 COMPARISON OF THE ACTIVATION BEHAVIOR OF INTESTINAL ADENYLATE CYCLASE BY E. coli AND V. cholerae ENTEROTOXINS. *(E.)* Kantor, H. S. (Cook County Hosp., Chicago, Ill.). *Clin. Res.* 22(4):614A, 1974.

8406 RAPID COLORIMETRIC ASSAY FOR INTESTINAL PEPTIDE HYDROLASES. *(E.)* Shoaf, C. R.; Isselbacher, K. J.; Heizer, W. D. (Univ. North Carolina Med. Sch., Chapel Hill). *Anal. Biochem.* 61(1): 72-85, 1974.

8407 FURTHER EVIDENCE FOR THE FORMATION IN VIVO OF PHOSPHOPEPTIDE IN THE INTESTINAL LUMEN FROM DIETARY β-CASEIN. *(E.)* Naito, H.; Suzuki, H. (Fac. Agric., Univ. Tokyo, Japan). *Agr. Biol. Chem.* 38(8):1543-1545, 1974.

8408 ENDOGENOUS RELEASE OF GASTRIC INHIBITORY POLYPEPTIDE (GIP) FOLLOWING FAT INGESTION IN MAN. *(E.)* Falko, J. M.; Crockett, S. E.; Cataland, S.; Mazzaferri, E. L. (Dept. Med., Ohio State Univ., Columbus). *Clin. Res.* 22(4):616A, 1974.

8409 ADENYLATE CYCLASE IN TWO SUBCELLULAR FRACTIONS OF INTESTINAL MUCOSA OF THE GUINEA PIG. *(E.)* Bouhours, J. F.; Bouhours, D.; Fargier, M. C.; Lambert, R. (Edward Herriot Hosp., Lyon, France). *Digestion* 10(3)213, 1974.

8410 EFFECT OF PHOSPHATIDYLCHOLINE ON TRIACYLGLYCEROL SYNTHESIS IN RAT INTESTINAL MUCOSA. *(E.)* O'Doherty, P. J. A.; Yousef, I. M.; Kuksis, A. (Dept. Biochem., Univ. Toronto, Canada). *Can. J. Biochem.* 52(9):726-733, 1974.

8411 EFFECT OF MORPHINE ON SEROTONIN RELEASE FROM MYENTERIC PLEXUS OF THE GUINEA PIG. *(E.)* Schulz, R.; Cartwright, C. (Dept. Pharmacol., Stanford Univ., Calif.). *J. Pharmacol. Exp. Ther.* 190(3):420-430, 1974.

8412 THE ROLE OF THE INTESTINE IN LIPID METABOLISM. *(Rus.)* Astvatsaturian, A. T.; Alimova, E. K.; Zharov, L. V. (Rostov Med. Inst. USSR). *Vopr. Pitan.* (4):3-8, 1974.

8413 INTESTINAL SECRETIONS. CURRENT CONCEPTS. *(Fr.)* Matuchansky, C.; Modigliani, R.; Bernier, J. J. (St. Lazare Hosp., Paris, France). *Biol. Gastroenterol. (Paris)* 7(2):85-90, 1974.

8414 INTESTINAL SECRETION OF PARENTERALLY INJECTED VITAMIN B_{12}. *(Rus.)* Volovoi, V. L.; Sinkova, I. G. (Tashkent Med. Inst., USSR). *Fiziol. Zh. SSSR* 60(8):1261-1266, 1974.

8415 STARCH HYDROLYSIS IN THE SMALL INTESTINE WHEN ITS BLOOD SUPPLY IS IMPAIRED AND THE BILE AND PANCREATIC DUCTS ARE LIGATED. *(Rus.)* Pulatov, A. S.; Povetko, T. B. (Andizhan Med. Inst., USSR). *Vopr. Pitan.* (4):11-15, 1974.

8416 GASTRIC HYPERSECRETION AFTER ANTACID INFUSION INTO THE SMALL INTESTINE. *(E.)* Alday, E. S.; Goldsmith, H. S. (Jefferson Med. Coll., Philadelphia, Pa.). *Surg. Gynecol. Obstet.* 139(3):333-336, 1974.

8417 INTRADUODENAL (ID) CALCIUM (Ca) STIMULATES PANCREATIC SECRETION AND GALLBLADDER EMPTYING IN MAN. *(E.)* Holtermuller, K. H.; McCall, J. T.; Malagelada, J. R.; Mayo, V. L. G. (Mayo Clin., Rochester, Minn.). *Eur. J. Clin. Invest.* 4(5):364-365, 1974.

8418 INFLUENCE OF OXYGEN BREATHING ON JEJUNAL TISSUE GASES DURING SUPERIOR MESENTERIC ARTERIAL OCCLUSION. *(E.)* Niinikoski, J.; Havia, T.; Arola, M. K.; Inberg, M. V. (Dept. Surg., Univ. Turku, Finland). *Scand. J. Gastroenterol.* 9(27):26, 1974.

8419 EFFECT OF VARIOUS DIETARY FATS ON THE SIZE AND DISTRIBUTION OF LYMPH FAT PARTICLES IN RAT. *(E.)* Boquillon, M.; Carlier, H.; Clement, J. (Animal Physiol. Nutr. Lab., Univ. Dijon, France). *Digestion* 10(4-5):255-266, 1974.

See also, 8168, 8169, 8171, 8179, 8181, 8187, 8192, 8198, 8199, 8261, 8368, 8586, 8590, 8847, 8905.

GENERAL

8420 EFFECT OF PORTAL VENOUS PRESSURE ON PORTAL VENOUS INFLOW AND SPLANCHNIC RESISTANCE. *(E.)* Mitzner, W. (Dept. Biomed. Eng., Johns Hopkins Univ., Baltimore, Md.). *J. Appl. Physiol.* 37(5):706-715, 1974.

The effect of portal venous pressure on the prehepatic splanchnic vascular resistance was studied in 2 unanesthetized and 12 anesthetized dogs (25 mg/kg pentobarbital). A hydraulically actuated cuff occluder was placed on the portal vein between the gastroduodenal vein and the liver, and an electromagnetic flow probe was placed around the portal vein between the gastroduodenal and gastrosplenic veins to measure portal venous flow. The experimental procedure consisted of inflating the occluder by graded amounts to produce varying degrees of upstream portal pressure elevation. Occlusions were held until the portal pressure and portal flow reached steady values (usually about 1 min). In 2 additional animals the placing of catheters, probe, and occluder was done under sterile conditions. The splanchnic resistance increased linearly with increases in portal pressure for all of the animals studied. The mean control arterial pressure was 119 ± 4 mm Hg, and the mean control portal venous pressure was 9.7 ± 0.7 mm Hg. The mean control value of splanchnic resistance was 7.9 ± 0.6 mm Hg/(ml/min/kg). The response was apparently not mediated *via* a synaptic neural mechanism since administration of 0.5 mg/kg of the ganglionic blocker pentolinium tartrate to 2 animals did not alter the response of splanchnic resistance to increases in portal pressure. Rapid splenectomy on 2 animals increased the pressure dependence of the remaining splanchnic resistance. The portal-splanchnic response observed suggests that alterations in total hepatic blood flow may be more effectively accomplished by changes in portal venous rather than hepatic arterial resistance. This response may also be partly responsible for the greatly decreased portal venous flow found in patients with cirrhosis.

8421 MEMBRANE POTENTIAL AND INPUT RESISTANCE IN ACINAR CELLS FROM CAT AND RABBIT SUBMAXILLARY GLANDS IN VIVO: EFFECTS OF AUTONOMIC NERVE STIMULATION. *(E.)* Kagayama, M.; Nishiyama, A. (Tohoku Univ. Sch. Med., Sendai, Japan). *J. Physiol. (Lond.)* 242(1):157-172, 1974.

8422 MEMBRANE POTENTIAL AND RESISTANCE MEASUREMENT IN ACINAR CELLS FROM SALIVARY GLANDS IN VITRO: EFFECT OF ACETYLCHOLINE. *(E.)* Nishiyama, A.; Petersen, O. H. (Inst. Med. Physiol. C., Univ. Copenhagen, Denmark). *J. Physiol. (Lond.)* 242(1):173-188, 1974.

8423 DESULFATION AND DEPOLYMERIZATION OF CHONDROITIN 4-SULFATE AND ITS DEGRADATION PRODUCTS BY RAT STOMACH, LIVER AND SMALL INTESTINE. *(E.)* Liau, Y. H.; Horowitz, M. I. (New York Med. Coll., Valhalla). *Proc. Soc. Exp. Biol. Med.* 146 (4):1037-1043, 1974.

8424 INTRA-ABDOMINAL OXYGEN AND CARBON DIOXIDE TENSIONS IN EXPERIMENTAL ADHESION DISEASE AND PERITONITIS. *(E.)* Renvall, S.; Niinikoski, J. (Dept. Surg., Univ. Turku, Finland). *Scand. J. Gastroenterol.* 9(27):26, 1974.

8425 ACTIVATION BY REDUCTIVE CLEAVAGE OF POTENTIALLY CYTOTOXIC AZO COMPOUNDS BY HUMAN HEPATOCELLULAR CARCINOMA. *(E.)* Autrup, H.; Thurlow, B. J.; Warwick, G. P. (Med. Sch., Univ. Nairobi, Kenya). *Biochem. Pharmacol.* 23(16):2341-2345, 1974.

8426 INCREASED GASTROINTESTINAL RADIOSENSITIVITY IN GENETICALLY ANEMIC W/W^v MICE. *(E.)* Torok, B. J.; Boggs, S. S. (Univ. Pittsburgh Med. Sch., Pa.). *Radiat. Res.* 59(1):138-139, 1974.

8427 INFLUENCE OF PHOSPHORORGANIC RADIOPROTECTIVE DRUGS ON POSTIRRADIATION CHANGES OF REACTIVITY TO BARIUM CHLORIDE IN GUINEA PIG INTESTINE. *(E.)* Wisniewski, K.; Zawadzka, E.; Kocmierska-Grodzka, D. (Med. Sch. Bialystok, Poland). *Strahlentherapie* 148(1):107-115, 1974.

8428 BLOOD PRESSURE IN ILEUM VESSELS. *(Rus.)* Kreps, E. M. (Kazan Postgrad. Med. Inst., USSR). *Dokl. Acad. Nauk SSSR* 218(4):730-732, 1974.

See also, 8299, 8430.

DIAGNOSTIC PROCEDURES

8429 DETECTION OF RECURRENCE OF LARGE-BOWEL CARCINOMA BY RADIOIMMUNOASSAY OF CIRCULATING CARCINOEMBRYONIC ANTIGEN (C.E.A.). *(E.)* Mach, J. P.; Jaeger, P.; Bertholet, M. M.; Ruegsegger, C. H.; Lossli, R. M.; Pettavel, J. (Inst. Biochem., Univ. Lausanne, Switzerland). *Lancet* (7880):535-540, 1974.

The usefulness and limitations of the carcinoembryonic antigen (CEA) radioimmunoassay for the evaluation of tumor resection and the detection of tumor relapse were studied in 101 patients with histologically proven adenocarcinoma of the colon or rectum. Plasma-CEA levels were determined before any treatment. A preoperative CEA value of 5 ng/ml or higher was found in 71% of all the patients and 63% of cases with localized tumor (Dukes A and B). This limit was reached by only 1 of 90 apparently healthy, nonsmoking blood-donor controls. A return to normal CEA levels occured in 40 of 45 patients following complete tumor resection. Subsequent elevations in CEA levels were observed in the 5 patients whose CEA did not fall below 5 ng/ml following surgery. All 5 exhibited subsequent tumor relapse. Follow-up studies of 22 of the surgical patients with repeated CEA radioimmunoassay for several months after surgery revealed progressively increasing CEA levels preceding clinical diagnosis of tumor relapse by 2-10 months for 8 patients. Six other patients showed a moderate increase in CEA levels, suggesting a tumor relapse not yet clinically detectable. The remaining 8 patients showed no increase in CEA level above 5 ng/ml and had no clinical symptoms of relapse. It is concluded that an incomplete drop of circulating CEA level 1 month after surgery appears to have a bad prognostic significance.

8430 HETEROGENEITY OF CARCINOEMBRYONIC ANTIGEN AND ITS FRACTIONATION BY CON A AFFINITY CHROMATOGRAPHY. *(E.)* Rogers, G. T.; Searle, F.; Bagshawe, K. D. (Charing Cross Hosp., London, England). *Nature (Lond.)* 251(5475):519-521, 1974.

Carcinoembryonic antigen (CEA) prepared from a large liver metastasis was separated with con A-Sepharose chromatography into 3 immunologically active fractions to demonstrate the heterogeneous nature of the antigen's composition. Antisera were prepared in rabbits by injecting into the flank 200 μg of a purified batch of CEA (M-12) in Freund's adjuvant. After extensive absorption with pooled normal colonic mucosa extract, normal human plasma, and liver extract, antiserum 174 produced an identical double diffusion reaction with all 3 fractions as well as an additional reaction with only 1 of the fractions. Various other antisera, such as "ace" 10, 22, 24, and 36 reacted similarly to antiserum 174, giving a single line of identity between all 3 fractions. Similar results were obtained with a later CEA preparation (M-31). The results indicated that CEA can be separated into at least 2 immunologically related fractions that contain determinants which can be distinguished by appropriate antisera. These fractions, however, remain indistinguishable by anti-CEA antisera such as Todd "ace" antisera which appear to react with a group common to each of the fractions. Further fractionation of CEA preparations may afford reagents for improving the specificity of the CEA assay and indicate whether circulating CEA shows a similar heterogeneity to preparations isolated from tumor tissue.

8431 SELECTIVE ARTERIOGRAPHY COMBINED WITH HYPOTONIC DUODENOGRAPHY FOR PANCREATIC LESIONS. *(E.)* Suzuki, T.; Uchida, K.; Tani, T.; Honjo, I. (Kyoto Univ. Med. Sch., Japan). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 122(2):398-405, 1974.

Five case reports of suspected pancreatic lesion are presented to illustrate the diagnostic value of selective arteriography combined with hypotonic duodenography. Selective arteriography showed irregular stenosis of both anterior superior and posterior superior pancreaticoduodenal arteries in a 41-yr-old female, but neither proliferated tumor vessels nor tumor stain were demonstrable. A duodenogram showed the circumferential constriction with an incisura defect of the mid-descending duodenum, suggestive of direct invasion by the pancreatic lesion toward the duodenum. The combination of vascular and duodenal images showed the extent of a carcinoma originating on the posterior surface of the head of the pancreas in a 45-yr-old female; the growth of the tumor could not be assessed by angiography alone. Use of the combined diagnostic procedure in a 58-yr-old male suggested that a duodenal deformity was due to compression by an enlarged gallbladder rather than to invasion by a carcinoma of the head of the pancreas. Combined duodenography-arteriography in a 65-yr old male resulted in a final diagnosis of carcinoma of the ampulla of Vater; simple arteriography indicated no pathology except for very meager findings in the finer branches of the pancreaticoduodenal arcades and distention of the cystic artery. Hypotonic duodenography combined with common hepatic arteriography suggested that a 69-yr-old male with cholangiolitic hepatitis was free of a pancreaticoduodenal lesion. All of the above diagnostic findings were confirmed by laparotomy. The combined roentgenogram is more useful than the summation of findings noted on 2 roentgenograms taken separately and permits identification of the precise location of vessels supplying the pancreas, visualization of the extent of the pancreatic lesion, confirmation of minimal changes in the finer vessels, and appropriate therapeutic planning.

8432 THE VALUE OF ULTRASONIC SCANNING IN THE DIAGNOSIS OF INTRA-ABDOMINAL ABSCESSES AND HEMATOMAS. *(E.)* Jensen, F.; Pedersen, J. F. (Gentofte Hosp., Copenhagen, Denmark). *Surg. Gynecol. Obstet.* 139(3):326-328, 1974.

Ultrasonic scanning examinations of intra-abdominal abscesses or hematomas were analyzed for 50 patients whose final diagnoses were obtained at surgery, by aspiration, spontaneous perforation, or at autopsy. Echo-informations during ultrasonic scanning were collected from a selected plane and placed at correct mutual relationships on a memory oscilloscope to form a sectional picture. Intra-abdominal hematomas and abscesses appeared as almost echo-free areas which disturbed the shape, localization, or inner structure of echo-giving organs. Suspected hematoma or abscess was confirmed in 31 of 34 patients, and negative diagnosis was correct in 12 of 16 patients. A large subphrenic abscess was revealed during surgery in one of 4 false-negative patients, while the remaining 3 were diagnosed as having abscesses from pus production. A carcinoma of the cecum was misdiagnosed as a multi-loculated abscess in one of 3 false-positive diagnoses. A local recurrence of a hypernephroma was ultrasonically diagnosed as an abscess or a hematoma in another patient. The ultrasonic findings in 2 examinations were inconclusive. Ultrasonics is unable to differentiate between an abscess and a hematoma; this distinction must be based on clinical data. Both lesions, however, are not as sharply circumscribed as cysts.

8433 DEMONSTRATION OF THE ABNORMAL LIPOPROTEIN OF CHOLESTASIS, LP-X, BY PRECIPITATION WITH POLYANION.

(E.) Ritland, S. (Rikshosp., Univ. Hosp., Oslo, Norway). *Scand. J. Gastroenterol* 9(5): 507-510, 1974.

Duplicate unfrozen serum or plasma samples from 96 patients with manifest or suspected liver disease and 4 patients with familial lecithin-cholesterol acyltransferase (LCAT) deficiency were examined for the abnormal lipoprotein X(LP-X) with immunoprecipitation and with polyanion-precipitation. The LP-X was electrophoretically separated from other lipoproteins and was tested by precipitation with anti-LP-X and by precipitation with polyanion. Immunoprecipitation detected LP-X in 40 samples, and this was confirmed by polyanion-precipitation in 39. Both methods were positive for 1:6 serial dilution and negative for 1:8 serial dilution. Concentrations of LP-X as low as 3.3 mg/100 ml were detectable by both methods. The LP-X test performed with polyanion-precipitation appears to be as reliable as the immunoprecipitation test and deserves wider use in the routine analysis of patients with liver disorders.

8434 LONG-TERM BODY RETENTION OF RADIOCOPPER (^{67}CU) AND THE DIAGNOSIS OF WILSON'S DISEASE.

(E.) Willvonseder, R.; Goldstein, N. P.; Tauxe, W. N. (Mayo Grad. Sch. Med., Univ. Minnesota, Rochester). *Mayo Clin. Proc.* 49(6):387-393, 1974.

Long-term body retention studies with ^{67}Cu were performed on 73 subjects to establish criteria for abnormal copper kinetics with this isotope and to investigate the isotope's value in the diagnosis of Wilson's disease. The following groups of patients were studied: 10 normal controls, 11 parents of patients with Wilson's disease (obligatory heterozygotes), 23 patients with a definite diagnosis of Wilson's disease (temporarily off penicillamine therapy), 17 relatives (other than parents or offspring) of patients with definite Wilson's disease, 10 patients with neurologic disorders, and 2 patients with liver disease (portal cirrhosis and fatty liver). In addition, 12 of the homozygous Wilson's disease patients were evaluated while on penicillamine treatment. Injections of 100 μC of carrier-free ^{67}Cu were administered i.v., and body retention at the end of each 24-hr period was calculated by subtracting the cumulative excreted activity (expressed as a percentage of the dose) from 100%. Plasma incorporation was computed by sampling blood at 10, 20, 30, 100, and 200 min after injection and then once daily on consecutive days. The mean value of retention half-times for homozygous Wilson's disease patients based on a 5-day observation period was about 150 days as compared to mean values of about 50 and 25 for patients heterozygous for Wilson's disease gene and normals, resp. Body retention of ^{67}Cu in homozygous Wilson's disease patients on D-penicillamine treatment was in the normal or carrier range, and 7 relatives of known Wilson's disease patients were normal. Most of the patients with neurological disorders were also in the normal or carrier range. One patient with portal cirrhosis was in the Wilson's disease range (120 day retention time). Discrimination of the various groups with ^{67}Cu studies was inferior to results obtained from previous studies using the shorter-lived ^{64}Cu isotope. A possible explanation might be an effect of the carrier copper on biliary excretion of copper and on individual bowel habits. Long-term body retention studies and simultaneous determination of plasma incorporation of ^{67}Cu with carrier copper might yield better discrimination of patients homozygous and heterozygous for Wilson's disease from the normal population.

8435 SENSITIVITY OF SERUM BILE ACID ASSAY FOR DETECTION OF LIVER DAMAGE IN VIRAL HEPATITIS TYPE B.

(E.) Hofmann, A. F.; Korman, M. G.; Krugman, S. (Mayo Clin., Mayo Fdn., Rochester, Minn.). *Am. J. Dig. Dis.* 19(10):908-910, 1974.

The sensitivity of serum bile acid radioimmunoassay for the detection of liver damage (viral hepatitis type B) was assessed by comparing the method with determinations of SGOT, bilirubin, and hepatitis B antigen in 5 children with mild, spontaneously remitting viral hepatitis (induced by parenteral inoculation with MS-2 serum). A serum cholyl conjugate value of 2 μM was used as the upper limit of normal for the bile acid assay. Increased bile acid values were observed in 15 of 47 serum samples, while 16 samples showed increased SGOT values. All patients were detected by both tests, and the time course of abnormal values was roughly similar for each test. Antigenemia preceded an elevation in transaminase or bile acid in 4 of 5 patients by 1-6 weeks. Serum bilirubin levels remained within normal limits in all patients but 1; in the latter bilirubin increased at the 10th week, when marked increases of serum bile acids and SGOT occurred. The serum bile acid values were as sensitive as SGOT values for detecting impaired liver functions in the patients with viral hepatitis and were a more sensitive index of liver damage than serum bilirubin in 4 patients who remained anicteric. Although the radioimmunoassay procedure used measures only cholyl conjugates, these may increase even more than dihydroxy bile acids in viral hepatitis.

8436 CONTRAST ROENTGENOGRAPHY IN THE MANAGEMENT OF MAJOR LIVER INJURY. *(E.)* Ayella, R. J.; Champion, H. R.; Gill, W.; Hankins, J. R.; Cowley, R. A. (Univ. Maryland Hosp., Baltimore). *Surg. Gynecol. Obstet.* 139(4):545-550, 1974.

The use of contrast roentgenography in the management of major liver injury is examined. During laparotomy for abdominal trauma, a Bakes dilator is gently passed into the portal vein, and a No. 8 to 10F soft plastic cannula is passed through the umbilical vein into the left portal vein and into the main portal vein. The umbilical vein is tethered to the skin by a suture to facilitate postoperative manipulation of the catheter. After an hepatic operation, a portable umbilical portohepatogram is performed. A survey film is made to identify the location of the catheter tip by its radiopaque marker line. A bedside portohepatogram is used essentially as a screening procedure in the early postoperative period or when the patient cannot be safely transported to specialized facilities. Obstruction of a portal vein branch or a filling defect in the sinusoidal phase is an indicator for further angiographic studies. The portohepatogram conducted in the angiographic suite may provide clues to indicate an expanding intrahepatic lesion. Veins appearing to be cut off or obstructed in a single portable view may in the more detailed examination be shown to exhibit some inequality in filling. The arteriogram will confirm the presence of a hematoma based on curvilinear arteries and a filling defect in the sinusoidal phase. The arteriogram and portohepatogram are of further value in determining the presence of perihepatic hematomas or abscesses as demonstrated by an increase in the space between the liver and surrounding structures. The hepatic venogram is predominantly used to demonstrate to the surgeon the proximity of large hepatic veins to the lesion.

8437 THE VALUE OF THE LATERAL ABDOMINAL ROENTGENOGRAM IN THE DIAGNOSIS OF NEONATAL HEPATIC PORTAL VENOUS GAS (HPVG). *(E.)* Kirks, D. R.; O'Byrne, S. A. (Brooke Army Med. Ctr., Fort Sam Houston, Tex.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 122(1):153-158, 1974.

The value of the lateral abdominal roentgenogram in the diagnosis of neonatal hepatic portal venous gas (HPVG) is illustrated with 3 case reports. A lateral abdominal roentgenogram confirmed the presence of pneumatosis intestinalis and HPVG in a 1786 g female (37 week gestation); a prior anteroposterior supine abdominal roentgenogram had demonstrated bowel distention, probable air within the bowel wall, and possible HPVG. The presence of HPVG was also confirmed by the lateral view in a premature 1068 g male (30 week gestation) displaying a rounded lucency just medial to the stomach on a anteroposterior abdominal roentgenogram. Evidence of HPVG in a 2052 g male (spontaneously delivered) was indicated only on the lateral view. The anteroposterior supine abdominal view in this case had revealed bowel distention and a mottled pattern in the left upper quadrant. The lateral abdominal roentgenogram may be obtained with either a vertical or horizontal beam. The roentgenologic appearance of HPVG on the lateral abdominal roentgenogram is manifested as a stellate lucency in the liver. The stellate appearance is believed to be due to contrast material seen end-on in large hepatic portal vein branches; surrounding and radiating linear densities are due to smaller peripheral branches.

8438 ANGIOGRAPHY OF THE JAUNDICED PATIENT WITH EMPHASIS UPON THE ANGIOGRAPHIC APPEARANCE OF BILIARY DUCT DILATION. *(E.)* Sprayregen, S.; Messinger, N. H. (Montefiore Hosp. Med. Ctr., Bronx, N.Y.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 122(2):335-355, 1974.

Selective visceral angiograms of 61 jaundiced patients were reviewed, with emphasis on the angiographic appearance of dilated hepatic ducts with obstructive jaundice. The angiography in these patients usually consisted of sequential anteroposterior celiac and right posterior oblique superior mesenteric arteriograms. Obstruction of the common bile duct was seen in 40 patients who had not had cholecystectomies; gallbladder dilatation was seen in 36 of these. Gallbladder distension in patients without cholecystectomies was present in 26 of 29 cases with carcinoma of the head of the pancreas, 1 case of carconoma of papilla of Vater, 1 case of lymphosarcoma of the head of the pancreas, 2 cases of gallbladder carcinoma, 3 cases of carcinoma of the common bile duct, 4 cases of calculi of the common bile duct, and 1 case of compression of the common hepatic duct. Dilated hepatic ducts were often present with obstruction; when dilated, the right hepatic ducts were usually more clearly demonstrated than the left hepatic ducts. Ductal defects were best demonstrated in the capillary and venous phases of the celiac arteriogram. The hepatic ducts as visualized on the angiograms were dilated in 29 of 54 patients with obstructive jaundice. No evidence of dilated ducts was noted in any of 7 patients with nonobstructive jaundice. The arteriogram appears to be very useful in suggesting whether jaundice is of the obstructive or nonobstructive type and, if obstructive, in determining the site and extent of the obstructing lesion.

8439 DYNAMIC STUDIES ON THE PORTAL HEMODYNAMICS BY SCINTIPHOTOSPLENOPORTOGRAPHY: THE VISUALIZATION OF PORTAL VENOUS SYSTEM USING ^{99m}Tc. *(E.)* Kashiwagi, T.; Kamada, T.; Abe, H. (Osaka Univ. Med. Sch., Japan). *Gastroenterology* 67(4):668-673, 1974.

The technique of scintiphotosplenoportography, which permits visualization of portal venous system by injection of $^{99m}TcO_4-$ into the spleen and follows its course through the portal circulation, was used to study 33 patients with the following diagnoses: hemolytic anemia (2), cholelithiasis (1), pulmonary tuberculosis (1), chronic cholangitis (1), acute hepatitis (1), chronic hepatitis (11), cirrhosis (9). fibrosis (2), idiopathic portal hypertension (2), liver cell carcinoma (1), carcinoma of the pancreas (1), and carcinoma of the gall bladder (1). Three types of images were obtained with this technique: in type I, the normal course of portal circulation progressing through splenic vein, portal vein, and liver was observed; in type II, the presence of abnormal portosystemic collateral channels was detected, but the predominant flow was to the liver; and in type III, diversion of the injection through portosystemic collaterals took place and no liver image was obtained. This technique also allowed quantitation of circulation times from spleen to liver and from spleen to heart. Scintiphotosplenoportography provides a method for evaluating and quantitating flow in the portal circulation. Insofar as the resolution of scintiphotosplenoportography is concerned, it falls considerably short relative to roentgenography.

8440 POSITIVE IMAGING OF LIVER TUMORS BY DELAYED HEPATIC SCINTISCANNING WITH ACIDIC IONIC INDIUM 113m CHLORIDE. *(E.)* Cuaron, A.; Gordon, F.; Rodriguez, C. (Natl. Med. Ctr., Mexican Inst. Social Security, Mexico City). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 122(2):318-326, 1974.

The diagnostic potential of delayed hepatic scanning with indium^{113m} chloride for differentiating "cold" areas produced by liver tumors with poor vascularity from those caused by hepatic cysts and abscesses was explored in 13 patients with hepatic primary carcinomata and 9 with metastases to the liver. A radiocolloid liver scan was first obtained 10 min after i.v. administration of 2 mC of In^{113m}-iron. A few hr later, or on the next day, a 2nd liver scan was procured 10 min after i.v. administration of 10 mC of ionic, carrier-free acidic In^{113m} chloride to depict the spacial distribution of the hepatic blood pool. A 3rd scan was obtained 6 hr after In^{113m} administration. Six hr after the i.v. In^{113m} administration, the cardiac blood pool still retained 24 ± 2% of the radioactivity detected 10 min after the administration of the radiopharmaceutical in contrast to a 36 ± 6% retention at the normal hepatic region and a 54 ± 10% retention at the site where the concentration defect was found with the radiocolloid. Tumor/liver radioactivity ratios were 0.09 ± 0.05 for the radiocolloid, 0.51 ± 0.16 10 min after administration of In^{113m} chloride, and 0.76 ± 0.26 6 hr later. On the delayed scans (6 hr after In^{113m} chloride administration), the images clearly showed the presence of radioactivity in the interior of 86.4% of hepatic tumors, including 3 cases where the radioactive level at the tumoral area was higher than in the normal hepatic region. The results were doubtful in 2 cases, and in 1 case the concentration defect persisted in the left hepatic lobe. Scintigraphic images of the hepatic blood pool, obtained 10 min after i.v. administration of In^{113m} chloride permitted a differential diagnosis in 40.9% of the cases (negative results in 4.5% of the cases) as compared to a differential diagnosis with delayed images for 86.4% of the cases. The results were in doubt in 0.1% of the cases and negative in 4.5% of the cases with the delayed scan. It was concluded that liver scintigraphy with radiocolloids combined with scanning of the distribution of hepatic blood pool with In^{113m} chloride to obtain more precise information on the degree of vascularity and blood flow in the interior of intrahepatic lesions improves the possibility of reaching a differential diagnosis between tumors and other space-occupying lesions.

8441 SERUM-ALPHA$_1$-FETOPROTEIN IN HEPATOCELLULAR CARCINOMA. *(E.)* Kohn, J.; Weaver, P. C. (Queen Mary's Hosp., London, England). *Lancet* (7876): 334-337, 1974.

Sera from 2225 patients (median age 50-70 yr, male/female ratio of 3.4/1) were screened for α_1-fetoprotein (AFP) by a sensitive countercurrent immunoelectrophoretic technique. Primary hepatocellular carcinoma was present in 107 of the cases; the remaining cases were mainly hepatic disorders. Positive AFP reactions were obtained in 90 out of the 107 hepatocellular carcinoma patients, including 5 cases of hepatoblastoma. Four cases which were negative to AFP screening with immunoelectrophoresis showed significantly raised serum-AFP levels upon radioimmunoassay. Raised AFP levels, usually transient and small, were observed in 16 cases of liver disease other than hepatocellular carcinoma and in 14 cases for which diagnoses were unavailable. The frequency of false-positives was 1.8%. The immunoelectrophoretic screening test for AFP detects serum-AFP at concentrations in the 200 ng/ml range and appears to be adequate for the detection of hepatocellular carcinoma in most cases. Radioimmunoassay reveals a greater percentage of AFP-positive cases but poses problems of interpretation. Raised AFP levels after surgery or chemotherapy indicate failure of treatment, although the converse does not necessarily hold.

8442 THE GASTROSCOPIC DIAGNOSIS OF GASTRITIS. WITH PARTICULAR REFERENCE TO MUCOSAL REDDENING AND MUCUS COVERING. *(E.)* Myren, J.; Serck-Hanssen, A. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(5):457-462, 1974.

8443 ENDOSCOPIC "JUMBO BIOPSY" IN THE STOMACH WITH A DIATHERMY LOOP. *(E.)* Deyhle, P.; Sauberli, H.; Nuesch, H. J.; Huni, R.; Jenny, S. (Dept. Int. Med., Univ. Zurich, Switzerland). *Acta Hepatogastroenterol.* 21(3):228-232, 1974.

8444 DIAGNOSTIC PROCEDURES AND FOLLOW-UP OF PATIENTS WITH VERIFIED MALGNANT DISEASE OF THE STOMACH. *(E.)* Dybdahl, J.; Myren, J.; Serck-Hanssen, A.; Leitao, J. (Ulleval Univ. Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(27):18-19, 1974.

8445 MYCOTIC INFECTIONS OF THE STOMACH - DIAGNOSIS BY 8MM COLOR FILM. *(E.)* Furugard, K.; Hradsky, M. (Dept. Med., Falu Hosp., Falun, Sweden). *Scand. J. Gastroenterol.* 9(27):21, 1974.

8446 GASTRIN RESPONSE TO CALCIUM INFUSION: AN AID TO THE IMPROVED DIAGNOSIS OF ZOLLINGER-ELLISON SYNDROME IN CHILDREN. *(E.)* Schwartz, D. L.; White, J. J.; Saulsbury, F.; Haller, Jr., J. A. (Johns Hopkins Univ. Sch. Med., Baltimore, Md.). *Pediatrics* 54(5):599-602, 1974.

8447 EXPERIMENTAL SUPPRESSION OF HEPATIC UPTAKE OF ^{75}Se-SELEMETHIONINE. *(E.)* Cho, K. J.; Doust, B. D. (Wayne Cty. Gen. Hosp., Eloise, Mich.). *J. Nucl. Med.* 15(12):1171-1173, 1974.

8448 RETROGRADE SMALL-BOWEL EXAMINATION. *(E.)* Miller, R. E. (Indiana Univ. Med. Ctr., Indianapolis). *JAMA* 229(11):1500-1501, 1974.

8449 DIAGNOSTIC ELECTRON MICROSCOPY OF FAECES. I. THE VIRAL FLORA OF THE FAECES AS SEEN BY ELECTRON MICROSCOPY. *(E.)* Flewett, T. H.; Bryden, A. S.; Davies, H. (East Birmingham Hosp., Birmingham, England). *J. Clin. Pathol.* 27(8):603-614, 1974.

8450 A COMPARATIVE STUDY OF DIAGNOSTIC METHODS FOR LACTASE DEFICIENCY. *(E.)* Arvanitakis, C.; Folscroft, J.; Chen, G. H.; Klotz, A. P. (Univ. Kansas Sch. Med., Kansas City). *Clin. Res.* 22(4): 601A, 1974.

8451 COLONOSCOPY IN THE MANAGEMENT OF COLON POLYPS. *(E.)* Williams, C. B.; Hunt, R. H.; Loose, H.; Riddell, R. H.; Sakai, Y.; Swarbrick, E. T. (St. Mark's Hosp., London, England). *Br. J. Surg.* 61(9):673-682, 1974.

8452 A RAPID METHOD OF OBTAINING A JEJUNAL BIOPSY USING A CROSBY CAPSULE AND A GASTROINTESTINAL FIBERSCOPE. *(E.)* Prout, B. J. (Roy. Cornwall Hosp., Truro, England). *Gut* 15(7):571-572, 1974.

8453 PREMEDICATION FOR JEJUNAL BIOPSY IN CHILDHOOD USING INTRAVENOUS DIAZEPAM AND METOCLOPRAMIDE. *(E.)* Anonymous. *Arch. Dis. Child.* 49(4):322-324, 1974.

8454 INTRAOPERATIVE FINE-NEEDLE ASPIRATION BIOPSY OF PANCREAS. *(E.)* Pantzar, P.; Koivuniemi, A.; Lempinen, M. (Helsinki Univ. Central Hosp., Finland). *Scand. J. Gastroenterol.* 9(27): 36, 1974.

8455 THE NORMAL ENDOSCOPIC PANCREATOGRAM. *(E.)* Cotton, P. B. (Middlesex Hosp., London, England). *Endoscopy* 6(2):65-70, 1974.

8456 SECRETIN DOSE - RESPONSE IN THE DIAGNOSIS OF CHRONIC PANCREATITIS. *(E.)* Petersen, H.; Myren, J. (Ullevaal Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(27):33, 1974.

8457 ENDOSCOPIC RETROGRADE PANCREATOGRAPHY IN PATIENTS WITH RECURRENT PANCREATITIS. *(E.)* Kruse, A.; Mathiasen, M. (Aarhus Commun. Hosp., Denmark). *Scand. J. Gastroenterol.* 9(27):34, 1974.

8458 ENDOSCOPIC RETROGRADE CHOLANGIO- AND PANCREATOGRAPHY. EXAMINATION TECHNIQUE ILLUSTRATED BY FILM. *(E.)* Kruse, A. (Aarhus Commun. Hosp., Denmark). *Scand. J. Gastroenterol.* 9(27): 34, 1974.

8459 ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY (ERCP). *(E.)* Sivak, Jr., M. V.; Sullivan, Jr., B. H. (Cleveland Clin., Ohio). *Cleve. Clin. Q.* 41(3):93-102, 1974.

8460 MINILAPAROTOMY: AN INTEGRATED PROCEDURE FOR RAPID DIAGNOSIS IN POSTCHOLECYSTECTOMY BILIARY TRACT SYMPTOMS. *(E.)* Mehta, M.; Del Guercio, L. R. M. (St. Barnabas Med. Ctr., Livingston, N.J.). *Ann. R. Coll. Surg. Engl.* 54(6):301-305, 1974.

8461 GREY-SCALE ULTRASONOGRAPHY IN THE INVESTIGATION OF OBSTRUCTIVE JAUNDICE. *(E.)* Taylor, K. J. W.; Carpenter, D. A. (Roy. Marsden Hosp., Sutton, England). *Lancet* (7880):586-587, 1974.

8462 LOCALIZATION OF THE PORTA HEPATIS BY ULTRASONIC SCANNING PRIOR TO PERCUTANEOUS TRANSHEPATIC PORTOGRAPHY. *(E.)* Burcharth, F.; Rasmussen, S. N. (Gentofte Hosp., Copenhagen, Denmark). *Br. J. Radiol.* 47(561):598-602, 1974.

8463 FINE-NEEDLE ASPIRATION OF MALIGNANT HEPATIC NODULES FOR CYTODIAGNOSIS. *(E.)* Hurwitz, A. L.; Gueller, R.; Pugay, P. (VA Hosp., San Francisco, Calif.). *JAMA* 229(7):814-815, 1974.

8464 A NEW AND UNUSUAL ROENTGENOGRAPHIC FINDING OF FATTY LIVER IN INFANTS. *(E.)* Swischuk, L. E. (Univ. Texas Med. Branch, Galveston). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 122(1):159-164, 1974.

8465 RELIABILITY OF LACTOSE TOLERANCE TEST WITH ETHANOL DURING PREGNANCY. *(E.)* Kesaniemi, Y. A.; Sahi, T.; Hiilesmaa, V. K. (Dept. Public Health Sci., Univ. Helsinki, Finland). *Scand. J. Gastroenterol.* 9(27):25, 1974.

8466 NEW TRENDS IN DIAGNOSIS AND TREATMENT OF UPPER GASTROINTESTINAL BLEEDING. *(E.)* Semb, L. S.; Myren, J. (Diakonhjemmets Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(5):415-416, 1974.

8467 THE USE OF A SHORT-LIVED RADIONUCLID (^{113}In) FOR THE DETECTION AND MONITORING OF BLEEDING IN THE UPPER GASTROINTESTINAL TRACT *(E.)* Forssman, O.; Holleander, A.; Pettersson, C.; Mulder, J. L. (Central Hosp., Malmo, Sweden). *Scand. J. Gastroenterol.* 9(27):10-11, 1974.

8468 PANENDOSCOPY IN THE EARLY DIAGNOSIS OF ACUTE UPPER GASTROINTESTINAL BLEEDING. A PROSPECTIVE STUDY. *(E.)* Seppala, K,; Lohva, J. (Central Hosp. Vaasa, Finland). *Scand. J. Gastroenterol.* 9(27):9, 1974.

8469 THE USE OF GLUCAGON DURING UPPER GASTROINTESTINAL ENDOSCOPY. *(E.)* Hradsky, M.; Furugard, K.; Stockbrugger, R.; Dotevall, G. (Falu Hosp., Falun, Sweden). *Scand. J. Gastroenterol.* 9(27):48-49, 1974.

8470 ENDOSCOPIC GASTROINTESTINAL EVALUATION. WITH CONVERTIBLE LENS SYSTEM AND BIOPSY CHANNEL EQUIPPED PANENDOSCOPE. *(E.)* Yamada, K.; Holyoke, D.; Endo, M.; Takemoto, T. (Roswell Park Mem. Inst., Buffalo, N.Y.). *NY State J. Med.* 74(11): 1950-1953, 1974.

8471 THE VALUE OF DETERMINING SERUM "BILE DUCT" PHOSPHATASE IN DIFFERENTIAL DIAGNOSIS. *(Ger.)* van Husen, N.; Eberhardt, G.; Gerlach, U. (Med. Clin., Univ. Munster, Germany). *Med. Welt* 24(40): 1510-1511, 1973.

8472 THE CYTOLOGICAL DIAGNOSIS OF GASTRIC WASHINGS: A VALUABLE AID IN CANCER DETECTION. *(Ger.)* Lederer, B.; Schwamberger, K.; Falser, N.; Walter, N.; Reissigl, H. (Pathol. Inst., Univ. Innsbruck, Austria). *Wien. Klin. Wochenschr.* 86(16): 464-466, 1974.

See also, 8383, 8588, 8620, 8653, 8711, 8712, 8714, 8761, 8772, 8826, 8851, 8853, 8855, 8897.

GASTROINTESTINAL DISEASES

ESOPHAGUS

8473 MORPHOLOGIC ASPECTS OF EXPERIMENTAL ESOPHAGEAL LYE STRICTURES. I. PATHOGENESIS AND PATHOPHYSIOLOGIC CORRELATIONS. *(E.)* Butler, II, C.; Madden, J. W.; Davis, W. M.; Peacock, Jr., E. E. (Univ. Arizona Coll. Med., Tucson). *J. Surg. Res.* 17 (4):232-244, 1974.

Esophageal lye injuries were created in 45 adult mongrel dogs by exposing a 5-cm length of esophagus to 20% sodium hydroxide at 30 cm pressure for 50 sec. During the first 2 weeks, morphological changes in the esophagus were similar in all dogs. Edema, coagulation necrosis of mucosa and submucosa, and cellulitis were observed within 48 hr. After 5 days the coagulum was replaced by edematous and inflamed granulation tissue. After 2 weeks deposition of scar collagen fibers and migration of surface epithelium from adjacent intact mucosa were evident. Changes after 2 weeks varied with the depth of injury. Of 39 surviving dogs, 9 had significant injury to the mucosa and submucosa only (Grade I), 6 had partial muscle injury (Grade II), and 24 had full-thickness injury penetrating the entire muscularis. Severe esophageal strictures (5 cm or less) were present in 17 of the 24 dogs with Grade III lesions but were absent in 7 of these dogs and in all 15 dogs with lesser injury. Thus, although stricture formation depends on full-thickness esophageal injury, such injury does not guarantee the development of stenosis. Stricture was not related to persistent mucosal ulceration, scar proliferation, or wall thickness. Stenosis resulted from an hourglass constriction of the whole esophagus in each case. Feeding patterns in dogs surviving acute burns did not correlate with size of the fixed esophagus but did correlate with the radiographic size. Functional and radiographic abnormalities were severe in some animals without significant esophageal narrowing at autopsy. Factors such as edema and peristaltic dysfunction may account for disparities between structural and functional effects of lye injury.

8474 CLINICAL AND MANOMETRIC INVESTIGATIONS OF THE LOWER ESOPHAGEAL SPHINCTER AND ITS REACTIVITY TO PENTAGASTRIN IN PATIENTS WITH HIATUS HERNIA. *(E.)* Siewert, R.; Weiser, F.; Jennewein, H. M.; Waldeck, F. (Univ. Gottingen Clin., Germany). *Digestion* 10(4/5):287-297, 1974.

Results of manometric tests on 45 patients with axial hiatus hernia correlated with the results of clinical investigation (anamnesis of reflux, HCl secretion after pentagastrin, x-rays, and esophagoscopy with biopsies). The manometric tests were 3-point manometry for measuring the reflexive pressure increase in the lower esophageal sphincter (LES) after abdominal compression and the continuous withdrawal method before and after pentagastrin injection (0.6 μg/kg i.v.). According to the results obtained by all methods, the patients could be divided into 2 groups. Group I consisted of 12 patients with a competent LES and normal reactivity to pentagastrin, no radiologic evidence of reflux, and moderate clinical symptoms. Group II comprised 33 patients with a basal LES pressure significantly below the 19.4 ± 7.3 mm Hg recorded for 20 normal controls and a lower pressure increase after pentagastrin stimulation than the control value of 29.9 ± 6.5 mm Hg. This group was also characterized by x-ray evidence of reflux (33), insufficient pressure increase in the LES after abdominal compression (29), esophagitis (17), stenosis (3), and hyperacidity (5). Based essentially on LES response to pentagastrin, group II patients could be divided into subgroup A with a normal LES response to pentagastrin (32.3 ± 8.9 mm Hg) and subgroup B with a significantly reduced response (12.8 ± 3.1 mm Hg). There was a good correlation between the abnormal pentagastrin response and the severity of the other parameters tested.

8475 TRANSTHORACOESOPHAGEAL LIGATION OF BLEEDING ESOPHAGEAL VARICES. A REAPPRAISAL. *(E.)* Wirthlin, L. S.; Linton, R. R.; Ellis, D. S. (Massachusetts Gen. Hosp., Boston). *Arch. Surg.* 109(5):688-692, 1974.

8476 THE MECHANISM OF VASOPRESSINS HAEMOSTASIS IN BLEEDING OESOPHAGEAL VARICES. *(E.)* Aronsen, K. F.; Nylander, G.; Mulder, J. L. (Dept. Surg., Univ. Lund, Sweden). *Scand. J. Gastroenterol.* 9(27):18, 1974.

8477 A NEW METHOD FOR NON-OPERATIVE TREATMENT OF BLEEDING ESOPHAGEAL VARICES. *(E.)* Vang, J.; Lunderquist, A. (Univ. Hosp., Lund, Sweden). *Scand. J. Gastroenterol.* 9(27):15, 1974.

8478 ADENOCARCINOMA IN SITU OF BARRETT'S ESOPHAGUS DIAGNOSED BY ENDOSCOPIC CYTOLOGY. *(E.)* Belladonna, J. A.; Hajdu, S. I.; Bains, M. S.; Winawer, S. J. (Mem. Sloan-Kettering Cancer Ctr., New York, N.Y.). *N. Engl. J. Med.* 291(17):895-896, 1974.

8479 LONG-TERM RESULTS OF SURGERY FOR CANCER OF THE MIDDLE THIRD OF THE ESOPHAGUS. *(Rus.)* Rusanov, A. A.; Pushilov, M. G. (Leningrad Pediatr. Med. Inst., USSR). *Vopr. Onkol.* 20(9):44-46, 1974.

8480 DIAGNOSIS AND TREATMENT OF CANCER OF THE ESOPHAGUS. *(Rus.)* Pushilov, M. G. (Leningrad Pediatr. Med. Inst., USSR). *Vopr. Onkol.* 20(6):101-106, 1974.

8481 AN EPIDEMIOLOGICAL STUDY OF OESOPHAGEAL ATRESIA. *(E.)* David, T. J.; O'Callaghan, S. E. (Bristol Gen. Hosp., England). *Br. J. Prev. Soc. Med.* 28(3):172-176, 1974.

8482 ELEVATED AMNIOTIC ALPHA-FETOPROTEIN IN CONGENITAL OESOPHAGEAL ATRESIA. REPORT OF A CASE. *(E.)* Seppala, M.; Laes, E.; Harvo-Noponen, M. (Univ. Central Hosp., Helsinki, Finland). *J. Obstet. Gynaecol. Br. Commonw.* 81(10):827-828, 1974.

8483 ESOPHAGEAL ATRESIA AND TRACHEOESOPHAGEAL FISTULA: SUPPORTIVE MEASURES THAT AFFECT SURVIVAL. *(E.)* Koop, C. E.; Schnaufer, L.; Broennle, A. M. (Children's Hosp. Philadelphia, Pa.). *Pediatrics* 54(5):558-564, 1974.

8484 ACHALASIA OF CRICOPHARYNGEUS MUSCLE AND PHARYNGEAL DIVERTICULUM. *(E.)* Nanson, E. M. (Dept. Surg., Univ. Auckland, New Zealand). *NZ Med. J.* 80(520):41-48, 1974.

8485 EXPERIMENTAL ESOPHAGITIS IN CATS AFFECTS LOWER ESOPHAGEAL SPHINCTER COMPETENCE. *(E.)* Eastwood, G. L.; Higgs, R. H. (US Naval Hosp., Philadelphia, Pa.). *Clin. Res.* 22(4):602A, 1974.

8486 DOES GASTRIN PLAY A ROLE IN THE PATHOGENESIS OF LOWER ESOPHAGEAL SPHINCTER INCOMPETENCE? *(E.)* Cohen, S. (Univ. Pennsylvania Hosp., Philadelphia). *Digestion* 10(4-5):298-300, 1974.

8487 FUNCTION OF THE LOWER OESOPHAGEAL SPHINCTER IN A POPULATION SELECTED AT RANDOM. A MANOMETRIC, RADIOLOGICAL, AND QUESTIONNAIRE STUDY. *(E.)* Spandow, O.; Sokjer, H.; Tibbling, L. (Dept. Otolaryngol., Univ. Linkoping, Sweden). *Acta Otolaryngol. (Stockh.)* 78(3-4):295-303, 1974.

8488 CLINICAL DIAGNOSIS OF ESOPHAGEAL HIATAL HERNIA. *(Rus.)* Piltsov, I. M.; Turbina, O. V.; Beliakov, E. N.; Barmin, V. S. (Hosp. No. 59, Moscow, USSR). *Ter. Arkh.* 46(4):107-110, 1974.

8489 RARE CAUSES OF BENIGN ESOPHAGEAL STENOSIS. *(Ger.)* Schratter, H.; Strahberger, E. (Surg. Clin., Univ. Vienna, Austria). *Wien. Klin. Wochenschr.* 86(19):566-571, 1974.

See also, 8503, 8862, 8884, 8886.

STOMACH

8490 CELLULAR SITES OF IMMUNOGLOBULINS. IV. STUDIES OF ANTRAL MUCOSA OF HUMAN STOMACHS. *(E.)* Chen, S. T.; Tobe, T. (Fac. Med., Kyoto Univ., Japan). *Digestion* 10(3):177-183, 1974.

The distribution of immunoglobulin (Ig)-containing cells in the gastric antral mucosa of 18 patients with various abnormalities of the stomach was studied by fluorescent antibody techniques. The abnormalities were chronic gastritis (5 cases), benign gastric ulcer (7), adenocarcinoma (3), undifferentiated cell carcinoma (2), and lymphosarcoma (1). The stroma under the surface epithelium and glandular crypts of the stomach were rich in plasma cells and lymphoid cells which reacted specifically with anti-IgA, anti-IgG, anti-IgM, anti-κ- or anti-λ-chain immunofluorescent agents. IgA-containing cells accounted for 58-94% (mean 76.2%) of fluorescent cells, IgM-containing cells for 3-27% (mean 13.4%), and IgG-containing cells for 3-28% (mean 10.4%). IgA type cells were diffusely scattered throughout the interstitial spaces between the crypts and in the lamina propria. IgM-containing cells tended to be concentrated in the interstitium of glands, whereas IgG-containing cells were usually found at the base of the lamina propria near the capillaries. In pyloric glands not disrupted by lesions, IgA was observed in the apical portion of epithelial cells, and IgM was seen extracellularly between the epithelial cells and in the lumen. In gastric cancer patients, IgG-containing immunocytes were visible in intermuscular spaces near the site of tumor cell invasion beneath the cancers. Malignant cells in 1 patient with undifferentiated cell carcinoma and in the patient with lymphosarcoma appeared to react with anti-IgG or anti-IgM. Immunoglobulins have not been previously identified on cancer cells in gastrointestinal tissue.

8491 GASTRIC PHYCOMYCOSIS. *(E.)* Lawson, H. H.; Schmaman, A. (Baragwanath Hosp., Johannesburg, South Africa). *Br. J. Surg.* 61(9):743-746, 1974.

A study was made of 9 patients, 7 with invasive gastric phycomycosis (1 infant, 5 men and 1 woman, aged 4 months to 50 yr) all of whom died, and 2 men (aged 33 and 41 yr) with superficial colonization only. Four cases of invasive fungal infection came to surgery with preoperative diagnoses of peritonitis (1) or perforation of a hollow viscus (3). A perforated gastric ulcer was found in each of these 4 cases and 2 had associated duodenal ulcers. The 2 patients in whom the fungus colonized the gastric mucosa without deeper invasion of the blood vessels had histories of 1 yr or more of dyspepsia. They presented with features of peritonitis or perforation, and were operated on for bleeding. A definite distinction between invasion and colonization can only be made histologically. However, invasion should be suspect at operation by the hardness of the tissues, by their black discoloration and a hyperemic zone between normal and abnormal areas. The fungus can invade the mucosa through a chronic gastric ulcer, where it usually occurs in relation to the lesser curvature, or as a result of ulceration occurring anywhere in the stomach during the course of a debilitating disease. In these 7 cases of invasive infection, the main problem was severe superimposed infection occurring as a result of leakage from the stomach, indicating poor general health in the presence of phycomycosis infection. Colonization does not apparently affect wound healing. If the patient is fit and phycomycosis is suspected, a partial gastrectomy should be carried out to remove the necrotic tissue. Amphotericin B therapy, potassium iodide in large doses, antibiotics to combat secondary bacterial infection, and cortisone are useful. Cephaloridine and gentamicin have been effective as an antibiotic combination. The type of lesion and the presence or absence of a severe underlying debilitating disease are the determining factors in the outcome of the disease.

8492 ACUTE GASTRODUODENAL DISEASE AFTER THERMAL INJURY. AN ENDOSCOPIC EVALUATION OF INCIDENCE AND NATURAL HISTORY. *(E.)* Czaja, A. J.; McAlhany, J. C.; Pruitt, Jr., B. A. (Brooke Army Med. Ctr., Fort Sam Houston, Tex.). *N. Engl. J. Med.* 291(18):925-929, 1974.

Early and serial endoscopic examinations of the stomach and duodenum were performed in 32 burn patients (31 men and 1 woman, aged 16-74 yr) to determine the incidence and natural history of acute gastroduodenal disease after thermal injury. The burn size varied from 23 to 96% of the body with the average size at 56.6% of body surface. Mortality was 75%. A total of 53 examinations were performed, the earliest at 12 hr after injury. Gastric erosions were noted in 25 of 29 patients with large burns. Seventeen of 23 (74%) had lesions within 72 hr after the burn. A gastric ulcer developed in 7 patients (22%). Ulcerations occurred only in diffusely abnormal areas and were not discovered before 72 hr after the burn. Duodenal ulceration was present in 9 patients (28%); all but 1 had concomitant gastric disease. In 2 cases, an ulcer evolved from an erosive duodenitis. The early development, morphology, and histology of the lesions suggested ischemic damage of the mucosa. These results indicate that acute gastroduodenal disease does develop in the majority of patients soon after thermal injury and that it frequently remains clinically inapparent. The early and frequent involvement of both stomach and duodenum indicate a common susceptibility to the initial insult. Serial endoscopic evaluations in 15 patients indicated that, although mucosal damage did occur early, the behavior of this mucosal injury was influenced by the nature of the patient's subsequent course. The 9 patients whose clinical course deteriorated with the onset of sepsis, hypotension, or respiratory insufficiency had progression of mucosal disease. Perforation or gastrointestinal hemorrhage requiring more than 3 U of blood replacement over 24 hr occurred mainly in patients with ulcers of the stomach or duodenum (8 of 9). Bleeding from erosive gastritis was rarely life threatening.

8493 EFFECTS OF PROXIMAL GASTRIC VAGOTOMY ON INTRAGASTRIC PRESSURE AND ADAPTATION IN PIGS. *(E.)* Stadaas, J; Aune, S; Haffner, J. F. W. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(5): 479-485, 1974.

The intragastric pressure/volume relation was studied in 6 anesthetized pigs with a large plastic bag placed in the stomach. Basal pressure, rhythmic activity and the time required for the basal pressure to stabilize after each alteration in volume (adaptation time), were studied after stepwise filling and emptying of the bag. Studies were made in the normal state, after proximal gastric vagotomy, and following additional truncal vagotomy. Three pigs serving as controls were studied twice: after laparotomy and after sham operation. After proximal gastric vagotomy, basal pressure increased significantly more with distention than before. A significant increase in adaptation time was noted as well as a marked reduction of rhythmic activity. Truncal vagotomy had no additional effects on the parameters in the present series. The lack of significant changes following additional truncal vagotomy indicates that extragastric vagal reflexes and vagal innervation to the distal part of the stomach seem of little importance for the basal pressure and volume adaptation. The motility disturbances noted after proximal gastric vagotomy may be partly due to devascularization, since proximal gastric vagotomy implies ligation of vessels combined with sectioning of cholinergic as well as adrenergic nerves to the lesser curvature. The reduction in rhythmic activity presumably results from reduced contractile activity in the proximal parts of the stomach. Rapid emptying of liquids by a rapidly increasing intragastric pressure may be the effect of proximal gastric vagotomy if the present findings apply to man.

8494 THE INFLUENCE OF TOTAL GASTRECTOMY ON SURVIVAL IN MALIGNANT ZOLLINGER-ELLISON TUMORS. *(E.)* Fox, P. S.; Hofmann, J. W.; Decosse, J. J.; Wilson, S. D. (Med. Coll. Wisconsin, Milwaukee). *Ann. Surg.* 180(4):558-566, 1974.

The effect of total gastrectomy on the biologic behavior of malignant gastrinomas was studied from patient data in the Zollinger-Ellison tumor registry. A total of 267 patients with documented metastatic tumor had definitive gastric operations. In the 137 patients who had total gastrectomy, survival was 75% at 1 yr, 55% at 5 yr, and 42% at 10 yr. In the 130 patients who had lesser gastric operations, survival was 51% at 1 yr, 27% at 5 yr, and 18% at 10 yr. Deaths from progressive tumor growth occurred in 17% of the 119 patients at risk after total gastrectomy and in 30% of the 91 patients at risk after lesser gastric operations. A subgroup of 127 patients with documented liver metastasis had definitive gastric operations. In the 73 patients who had total gastrectomy, survival was 68% at 1 yr, 42% at 5 yr, and 30% at 10 yr. In the 54 patients who had lesser gastric operations, survival was 44% at 1 yr, 7% at 5 yr, and none at 10 yr. Deaths from progressive tumor growth occurred in 25% of the 64 patients at risk after total gastrectomy and 50% of the 36 patients at risk after lesser gastric operations. Regression of metastatic Zollinger-Ellison tumor was documented in only 4 patients, all of whom had total gastrectomy. Presumptive regression of primary tumor occurred in 7 patients, 5 of whom had total gastrectomy. The data demonstrate that total gastrectomy is the procedure of choice for malignant Zollinger-Ellison tumors, even in the presence of widespread metastasis. The results for total gastrectomy indirectly support the concept of a gastric influence on tumor growth; however, the results also show that total gastrectomy does not provide permanent or predictable protection against subsequent tumor growth and metastasis.

8495 INHIBITORY EFFECTS OF L-GLUTAMINE ON THE ASPIRIN-INDUCED GASTRIC LESIONS IN THE RAT. *(E.)* Okabe, S.; Takeuchi, K.; Nakamura, K.; Takagi, K. (Fac. Pharmaceut. Sci., Univ. Tokyo, Japan). *J. Pharm. Pharmacol.* 26(8):605-611, 1974.

8496 THE EFFECTS OF BUFFERED ACETYLSALICYLIC ACID ON THE HUMAN GASTRIC MUCOSA AS REVEALED BY GASTROCAMERA. *(E.)* Edmar, D. (Sahlgren's Hosp., Univ. Goteborg, Sweden). *Scand. J. Gastroenterol.* 9(27):18, 1974.

8497 BLEEDING GASTRITIS INDUCED BY LONG-TERM RELEASE ASPIRIN. *(E.)* Hoon, J. R. (Sheboygan Clin., Wisc.). *JAMA* 229(7):841-842, 1974.

8498 EFFECTS OF BIOGENIC MONOAMINES AND PRECURSORS ON STRESS ULCERS AND SECRETION IN STOMACH. *(E.)* Nakane, S.; Sakai, T. (Taisho Pharm. Co., Tokyo, Japan). *Jap. J. Pharmacol.* 24(2):241-246, 1974.

8499 EROSIVE GASTRODUODENAL LESIONS. *(Rus.)* Sokolov, L. K.; Rizhikov, V. N.; Gavrilenko, Ia. V.; Zotov, V. M.; Ivanov, V. F. (4th Dept. Min. Publ. Health, Moscow, USSR). *Ter. Arkh.* 46(4):101-106, 1974.

8500 ANTIPEPTIC AND ANTIULCER ACTIVITY OF SULFATED GLYPTIDE (GLPS) AND SODIUM BICARBONATE IN PYLORUS-LIGATED RATS. *(Jap.)* Okabe, S.; Takeuchi, K.; Honda, K.; Takagi, K. (Fac. Pharm. Sci., Univ. Tokyo, Japan). *J. Pharm. Soc. Jap.* 94(8):1037-1039, 1974.

8501 EMERGENCY GASTROSCOPY IN GASTRODUODENAL BLEEDING. *(Rus.)* Ivanov, V. F.; Terentiev, N. M.; Gallinger, Iu. I.; Kliavin, Iu. A.; Ezhova, G. I. (4th Dept. Min. Publ. Health, Moscow, USSR). *Ter. Arkh.* 46(4):96-101, 1974.

8502 DIAGNOSIS OF BENIGN NONEPITHELIAL GASTRIC TUMORS. *(Rus.)* Kareva, A. I.; Doriomedova, L. A. (S. M. Kirov Inst. Postgrad. Med., Leningrad, USSR). *Vopr. Onkol.* 20(9):64-69, 1974.

8503 SMOOTH MUSCLE TUMORS OF THE STOMACH AND ASSOCIATED GASTROINTESTINAL ULCERATION. *(E.)* Parry, R. G. (Boston City Hosp., Mass.). *Am. Surg.* 40(10):582-585, 1974.

8504 VITAMIN B_{12} DEFICIENCY AND LACK OF INTRINSIC FACTOR ASSOCIATED WITH A SMOOTH MUSCLE TUMOR OF THE STOMACH. REMISSION AFTER SURGERY. *(E.)* Zecler, E.; Leiba, H.; Eshchar, J.; Reif, R.; Gilboa, Y. (Asaf Harofe Gov. Hosp., Zerifin, Israel). *Isr. J. Med. Sci.* 10(9):1139-1142, 1974.

8505 OSTEOBLASTOMA OF THE STOMACH (CASE REPORT). *(Rus.)* Koschug, G. D.; Korlatsan, V. V. (Res. Inst. Onkol., Kishinev, USSR). *Vopr. Onkol.* 20(9):113-114, 1974.

8506 EPIDEMIOLOGICAL ASPECTS OF GASTRIC CARCINOMA. *(E.)* Lehtola, J.; Varis, K.; Ihamaki, T.; Isokoski, M.; Kekki, M.; Siurala, M. (Meilahti Hosp., Helsinki, Finland). *Scand. J. Gastroenterol.* 9(27):46-47, 1974.

8507 HISTOLOGICAL DIFFERENTIATION OF GASTRIC CARCINOMA. RELATION OF DIFFERENT TYPES TO SOME CLINICAL PARAMETERS. *(E.)* Sipponen, P.; Ihamaki, T.; Saukkonen, M.; Kekki, M.; Siurala, M. (Central Lab. Pathol., Univ. Helsinki, Finland). *Scand. J. Gastroenterol.* 9(27):47, 1974.

8508 THE CONTROL OF STOMACH CANCER. *(E.)* Backett, M. (Dept. Commun. Health Med. Sch., Univ. Nottingham, England). *Neoplasma* 21(2):249-253, 1974.

8509 GASTRIC CANCER CONTROL. *(E.)* Gregor, O. (Dept. Med., Charles Univ., Prague, Czechoslovakia). *Neoplasma* 21(2):235-248, 1974.

8510 ATROPHIC GASTRITIS AND GASTRIC CARCINOMA: SOME GENETICAL ASPECTS. *(E.)* Ihamaki, T.; Varis, K.; Isokoski, M.; Kekki, M.; Sipponen, P.; Siurala, M. (Meilahti Hosp., Helsinki, Finland). *Scand. J. Gastroenterol.* 9(27):45, 1974.

8511 NODULAR GASTRITIS - A RADIOLOGICAL, PATHOLOGICAL AND SECRETORY STUDY. *(E.)* Hunt, J.; Barratt, P.; Wood, H.; Clarke, A.; Piper, D. W. (Roy. North Shore Hosp., Sydney, Australia). *Aust. NZ J. Med.* 4(3):303, 1974.

8512 SURGICAL MANAGEMENT OF REFLUX GASTRITIS. *(E.)* Herrington, Jr., J. L.; Sawyers, J. L.; Whitehead, W. A. (Vanderbilt Univ. Med. Ctr., Nashville, Tenn.). *Ann. Surg.* 180(4):526-537, 1974.

8513 CHANGES IN GASTRIC PHYSIOLOGY AFTER OPERATIONS ON THE STOMACH. *(Ger.)* Demling, L. (Med. Clin., Univ. Erlangen, Germany). *Munch. Med. Wochenschr.* 116(43):1857-1860, 1974.

8514 CORRELATION BETWEEN EMPTYING OF THE GASTRIC STUMP AND EFFERENT LOOP FUNCTION IN DUMPING SYNDROME. *(Rus.)* Balaian, R. A. (Yerevan Med. Inst., USSR). *Sov. Med.* (6):72-76, 1973.

See also, 8144, 8250, 8297, 8299, 8442, 8444, 8445, 8469, 8472, 8536, 8594, 8837, 8862, 8886.

STOMACH

Peptic Ulcers

8515 INHIBITION OF GASTRIC ACID SECRETION AND ULCER FORMATION IN THE RAT BY ORALLY-ADMINISTERED 11-DEOXYPROSTAGLANDIN ANALOGUES: 15-HYDROXY-16,16-DIMETHYL-9-OXOPROST-5,13-DIENOIC ACIDS. *(E.)* Lippmann, W. (Biochem. Pharm. Dept., Ayerest Lab., Montreal, Canada). *Prostaglandins* 7(3):231-246, 1974.

The 11-deoxyprostaglandin analogue 15(nat)-hydroxy-16,16-dimethyl-9-oxoprost-5,13-dienoic acid (AY-24,609) effectively inhibited gastric acid secretion and ulcer formation in the rat when administered p.o. (0.2 ml in 0.2% carboxymethyl cellulose). In comparison with the structurally related 15-hydroxy-15-methyl-9-oxoprostanoic acid (AY-22,469), AY-24,609 was 8.7 times more potent in inhibiting basal acid secretion and 9.0 times more potent in inhibiting pylorus ligation-induced ulcers in female albino rats. In male albino rats, AY-24,609 was 4.8 times more potent than AY-22,469 in inhibiting ulcer formation induced by indomethacin (0.5 ml i.p.). The median effective dose for causing diarrhea in the 24-hr fasted rat was 7 mg/kg for AY-24,609 and 140 mg/kg for AY-22,469. The analogue 15(epi)-hydroxy-16,16-dimethyl-9-oxoprost-5,13-dienoic acid (AY-24,696) was less active than AY-24,609. In comparison with AY-22,469, its relative potencies for the above activities were 0.6, 1.6, and 2.5, resp. The median effective dose for producing diarrhea was 49 mg/kg. In general, gastric juice volume was not altered by AY-24,609 and AY-22,469. Both analogues appear to be potentially useful therapeutic agents for treatment of gastric hypersecretion and peptic ulcers.

8516 RESTING GASTROESOPHAGEAL SPHINCTER PRESSURE IN PATIENTS WITH GASTRIC OR DUODENAL ULCER. *(E.)* Csendes, A.; Acevedo, J. C. (Jose Joaquin Aguirre Hosp., Univ. Chile, Santiago). *Digestion* 10(4-5):282-286, 1974.

Resting gastroesophageal sphincter pressure was measured with continuously perfused catheters in 40 control subjects (23 men and 17 women, aged 19-68 yr), in 21 patients (10 women and 11 men, aged 23-65 yr) with benign gastric ulcer, and in 26 patients (18 men and 8 women, aged 22-69 yr) with duodenal ulcer. Gastric acid secretion was also determined. No significant differences in resting sphincter pressure were noted in any group. Spontaneous gastric output was similar among normals and gastric ulcer patients, but duodenal ulcer patients secreted more acid during the basal period than did controls. The maximal acid output after histamine (0.04 mg/kg) was significantly reduced in gastric ulcer patients when compared to controls or to duodenal ulcer patients. No correlation between resting gastroesophageal sphincter pressure and basal secretion of acid or between resting gastroesophageal sphincter pressure and maximal acid output was found for any group separately or for all 3 groups combined.

8517 ULCER DISEASE, METABOLIC ALKALOSIS AND HYPERPARATHYROIDISM: A MECHANISM OF INTERRELATIONSHIP? *(E.)* Kaplan, E. L.; Peskin, G. W.; Deveney, C.; Way, L.; Jaffe, B. (Univ. Chicago Hosp., Ill.). *Ann. Surg.* 180(4):549-557, 1974.

The effects of sodium bicarbonate (300 mEq, 3.6-5.8 mEq/kg) infused i.v. over a 90-min period were studied in 5 normocalcemic controls and 5 patients with primary hyperparathyroidism. In each control infusion induced a typical hypokalemic, hypochloremic metabolic alkalosis. Arterial pH increased from 0.06 to 0.14 U. Mean serum calcium concentration decreased 1.2 mg/100 ml during the 90-min period; serum ionized calcium, determined in 1 subject, decreased 1.2 mg/100 ml. The mean parathyroid hormone concentration increased from 35 μl-Eq/ml (basal) to 112 μl-Eq/ml at 75 min. Serum gastrin did not change significantly during infusion although gastric acid secretion decreased in 4 of the 5 subjects. Of the 5 patients with hyperparathyroidism, 4 had multiglandular disease and only 1 appeared to have a single adenoma. In response to bicarbonate infusions, arterial pH in this group increased from 0.11 to 0.19 U. Total calcium concentration decreased in each patient, the maximal mean decrease in serum calcium of 1.4 mg/100 ml occurring at 60 min. The mean basal parathyroid hormone concentration of 170 μl-Eq/ml increased to 289 μl-Eq/ml 60 min after the start of the infusion. Mean gastrin concentrations were normal in these subjects and did not change during induction of alkalosis. The cycle of metabolic alkalosis, depressed serum ionized calcium concentration, and parathyroid stimulation demonstrated in this study may represent a major mechanism in the etiology of parathyroid disease associated with severe peptic ulcer disease and Zollinger-Ellison tumors. The data also indicate that sodium bicarbonate is a safe and effective agent for release of parathyroid hormone.

8518 THE CARBOHYDRATE AND ESTER SULFATE CONTENT OF MUCOSAL BIOPSIES IN HEALTH AND IN PA-

TIENTS WITH DUODENAL ULCER. *(E.)* Andre, F.; Bouhours, D.; Andre, C.; Descos, F.; Lambert, R. (Edward Herriot Hosp., Lyon, France). *Clin. Chim. Acta* 56(3):255-259, 1974.

The carbohydrate and ester sulfate content of duodenal mucosal biopsies from 11 patients with duodenal ulcer and from 11 control subjects were determined by gas-liquid chromatography. The net amounts and molar ratios (to glucosamine) were similar in both groups. The composition of duodenal biopsies expressed as percent of dry material for duodenal ulcer patients were: N-acetylglucosamine, 2.42; N-acetylgalactosamine, 2.26; fucose, 1.89; galactose, 1.89; mannose, 2.98; glucose, 0.40; glucose, 2.50; and sulfate, 0.70. The lack of any quantitative or qualitative difference in glycoprotein components between the two groups of subjects suggests that sulfated glycoproteins, which inhibit the proteolytic activity of pepsin, are not involved in the pathogenesis of duodenal ulcer.

8519 H^+ SECRETION AND Na^+-K^+-DEPENDENT ATPase SYSTEM IN THE HUMAN GASTRIC MUCOSA. *(E.)* Mozsik, G.; Nagy, L.; Tarnok, F.; Vizi, F.; Kutas, J. (Univ. Med. Sch., Pecs, Hungary). *Pharmacology* 11(3): 1024-1025, 1974.

8520 GASTRIC ACID SECRETION IN CHINESE, INDIAN AND MALAY SUBJECTS - A COMPARATIVE STUDY. *(E.)* Fung, W. P. (Dept. Med., Univ. Singapore). *Aust. NZ J. Med.* 4(3):301, 1974.

8521 ORAL GASTRIC ACID SECRETION - INHIBITORY ACTIVITY AND ANTI-ULCER ACTIVITY OF SYNTHETIC PROSTAGLANDIN ANALOGUES: C-15 EPIMERS OF 15-HYDROXY-15-METHYL-9-OXYPROSTANOIC ACID. *(E.)* Lippmann, W. (Biochem. Pharmacol. Dept., Ayerst Lab., Montreal, Canada). *Prostaglandins* 7(3):223-230, 1974.

8522 EFFECT OF ATROPINE ON INSULIN STIMULATED GASTRIC SECRETION AND GASTRIN RELEASE. *(E.)* Schrumpf, E.; Vatn, M. H.; Myren, J.; Semb, L. S. (Ulleval Univ. Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(27):40, 1974.

8523 EFFECT OF H_2-RECEPTOR BLOCKADE ON VAGALLY INDUCED GASTRIC SECRETION IN MAN. *(E.)* Carter, D. C.; Forrest, J. A. H.; Werner, M.; Heading, R.; Park, J.; Shearman, D. J. C. (Roy. Infirm., Edinburgh, Scotland). *Eur. J. Clin. Invest.* 4(5): 334-335, 1974.

8524 ETIOLOGY OF PEPTIC ULCER. *(E.)* Crean, G. P. (Southern Gen. Hosp., Glasgow, Scotland). *Practitioner* 213:27-36, 1973.

8525 RELATIONSHIP OF PROSTAGLANDIN E (PGE) TO PEPTIC ULCER DISEASE. *(E.)* Hinsdale, J.; Engle, J.; Wilson, D. (Univ. Illinois, Chicago). *Clin. Res.* 22(4):664A, 1974.

8526 PROGNOSTIC ASSESSMENT AND INDICATIONS FOR TREATMENT OF PATIENTS WITH CHRONIC ULCERS. *(Ger.)* Overbeck, G. (Psychosomatic Clin., Giessen, Germany). *Munch. Med. Wochenschr.* 116(43):1865-1870, 1974.

8527 TREATMENT OF HOSPITALIZED PATIENTS WITH PEPTIC ULCER WITHOUT THE USE OF DRUGS OR DIET. *(Rus.)* Norkunas, P. I.; Machiunas, L. I. (Vilnius Univ., USSR). *Sov. Med.* (6):92-95, 1973.

8528 ENZYME PRODUCTION BY THE STOMACH IN PATIENTS WITH PEPTIC ULCER AND CHANGES IN IT DURING TREATMENT. *(Rus.)* Dzharimov, A. Ia. (Kuban Med. Inst., Krasnodar, USSR). *Ter. Arkh.* 46(4):118-120, 1974.

8529 SPOT CONTACT THERMOMETRY IN PATIENTS WITH PEPTIC ULCER. *(Rus.)* Uspenskii, V. M.; Stefanenko, Iu. F. (S. M. Kirov Mil. Med. Acad., Leningrad, USSR). *Ter. Arkh.* 46(4):81-84, 1974.

8530 FOLLOW-UP OF CONSERVATIVELY AND SURGICALLY TREATED PATIENTS WITH PEPTIC ULCER. *(Ger.)* Luchmann, A. (Sanitorium LVA Rhineland-Palatinate Liver Metabolic Dis., Bad Salzig, Germany). *Therapiewoche* 24(4):318-324, 1974.

8531 GASTRIC MYELOELECTRICAL ACTIVITY DURING DUODENAL ACIDIFICATION IN CONTROL SUBJECTS AND PATIENTS WITH DUODENAL ULCER. *(Fr.)* Couturier, D.; Roze, C.; Sainz, R.; Accary, J. P.; Debray, C. (Bichat Hosp., Paris, France). *Biol. Gastroenterol. (Paris)* 7(2):91-100, 1974.

8532 CIGARETTE SMOKING AND GASTRIN RELEASE IN DUODENAL ULCER. *(E.)* Mazzacca, G.; Budillon, G.; De Marco, F.; Perillo, G. N. (2nd Sch. Med., Univ. Naples, Italy). *Eur. Soc. Clin. Invest.* 4(5): 380, 1974.

8533 REVERSIBLE BASAL GASTRIC HYPERSECRETION WITH PARATHYROID ADENOMAS AND DUODENAL ULCER. *(E.)* Scobie, B. A. (Wellington Hosp., New Zealand). *Aust. NZ J. Med.* 4(3):292-295, 1974.

8534 CHRONIC GASTRODUODENITIS DUE TO LAUNDRY BLEACH. SOCK SUCKER SYNDROME. *(E.)* Loeb, F. X.; King, T. L. (Ochsner Clin., New Orleans, La.). *Am. J. Dis. Child.* 128(2):256-257, 1974.

8535 PERFORATED DUODENAL ULCER WITH COEXISTENT GASTRIC CARCINOMA. *(E.)* Brodman, H. R.; Brodman, R. F.; Cioffaro, W. E.; Gliedman, M. L. (Montefiore Hosp., New York, N.Y.). *Arch. Surg.* 109(4):524, 1974.

8536 EXPERIMENTAL PRODUCTION OF DUODENAL ULCERS. *(E.)* Robert, A. (Dept. Exp. Biol., Upjohn Co., Kalamazoo, Mich.). *Biol. Gastroenterol. (Paris)* 7(2):145-161, 1974.

8537 THE RESULTS OF REOPERATION FOR BILE VOMITING FOLLOWING SURGERY FOR PEPTIC ULCER. *(E.)* Griffiths, J. M. T.; Smith, A. N.; Small, W. P.; Falconer, C. W. A. (Western Gen. Hosp., Edinburgh, Scotland). *Br. J. Surg.* 61(10):838-843, 1974.

8538 THE ELECTIVE SURGICAL TREATMENT OF CHRONIC DUODENAL ULCER: A CRITICAL REVIEW. *(E.)* Wise, L.; Ballinger, W. F. (Washington Univ. Sch. Med., St. Louis, Mo.). *Surgery* 76(5):811-826, 1974.

8539 SELECTIVE VAGOTOMY AND DRAINAGE FOR BLEEDING DUODENAL ULCER. *(E.)* Jensen, H. E.; Guldberg, O. (Kommune Hosp., Copenhagen, Denmark). *Acta Chir. Scand.* 140(5):406-409, 1974.

8540 GASTRIC ULCER TREATED WITH SELECTIVE PROXIMAL VAGOTOMY (SPV). *(E.)* Hedenstedt, S.; Moberg, S. (Nacka Hosp., Sweden). *Acta Chir. Scand.* 140(4):309-312, 1974.

8541 ENDOSCOPIC SURVEY OF GASTRIC ULCER DISEASE. *(E.)* Gibb, S. P.; Park, S. K. (Presbyterian Hosp., Daegu, Korea). *Lahey Clin. Fdn. Bull.* 23(4):150-157, 1974.

8542 CHANGES IN BLOOD FLOW ASSOCIATED WITH GASTRIC ULCER IN CATS. *(E.)* Skarstein, A.; Svanes, K.; Svanes, T. (Dept. Gen. Surg., Univ. Bergen, Norway). *Scand. J. Gastroenterol.* 9(27):42, 1974.

See also, 8242, 8294, 8295, 8296, 8298, 8492, 8493, 8496, 8503, 8708.

SMALL INTESTINE

8543 TAUROCHOLATE METABOLISM IN PATIENTS WITH SMALL INTESTINAL STAGNANT LOOPS. *(E.)* Arnesjo, B.; Sorbris, R.; Kock, N. G. (Univ. Hosp., Lund, Sweden). *Scand. J. Gastroenterol.* 9(6):579-585, 1974.

Tracer doses of ^{35}S-tauro-7-^{3}H-cholate were given to 11 patients (7 women and 4 men, aged 14-70 yr), 3 with duodenal or jejunal diverticula without malabsorption, 4 with proximal stagnant loops and malabsorption, and 4 with distal stagnant loops and slight malabsorption. Duodenal aspirates obtained during the following 2 days were examined. Specific radioactivities of both isotopes were determined. Patients with proximal blind loops without malabsorption had a taurocholate metabolism no different from healthy individuals. Patients with stagnant loop syndromes, regardless of the location of the lesions, had diminished taurocholate pool sizes, increased turnover of taurocholate, increased taurocholate synthesis, and increased rates of deconjugation and, provided an intact colon was present, increased rates of 7-α-dehydroxylation. In 4 cases the administered isotopes disappeared too rapidly to allow accurate estimation of their taurocholate metabolism. In 4 patients with ileostomy-reservoir after panproctocolectomy, low duodenal bile acid concentrations were found with virtually no deoxycholate, whereas the glycine/taurine bile acid molar ratios were normal. The remaining patients with stagnant loop syndromes had normal duodenal bile acid concentrations, increased glycine/taurine molar ratios, and normal trihydroxy/dihydroxy molar ratios. These results indicate that patients with stagnant loops and malabsorption have increased taurocholate turnover, with increased rates of bacterial modification of taurocholate yielding higher concentrations of free bile acids by an increased rate of deconjugation in the intestine. This finding, coupled with the increased rate of measurable 7-α-dehydroxylation, indicates a larger proportion of the free bile acids present in the small intestinal lumen of these patients, consisting of the more toxic secondary bile acids, deoxycholic or lithocholic acid.

8544 SMALL BOWEL IN IMMUNOGLOBULIN DEFICIENCY SYNDROMES. *(E.)* Marshak, R. H.; Hazzi, C.; Lindner, A. E.; Maklansky, D. (Mt. Sinai Sch. Med., City Univ. New York, N.Y.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 122(2):227-240, 1974.

Immunoglobulin deficiency syndromes with gastrointestinal manifestations may be primary or secondary to some other disease involving the gastrointestinal tract. The primary disorders can be classified as variable immunoglobulin deficiency, comprising the majority of patients with immunodefciency, and selective IgA deficiency. The 3 subcategories of variable immunoglobulin deficiency are (1) hypogammaglobulinemic sprue; (2) hypogammagloublinemia with pernicious anemia and atrophic gastritis; and (3) dysgammaglobulinemia with nodular lymphoid hyperplasia of the small intestine and giardiasis. Selective IgA defiency includes: (1) IgA deficient sprue with gluten enteropathy, villous atrophy, and presence of ample plasma cells in the lamina propria; and (2) IgA deficiency with nodular lymphoid hyperplasia of the small intestine (uncommon). Secondary disorders comprise: (1) decreased immunoglobulin synthesis and/or increased synthesis of abnormal immunoglobulins (e.g., plasma cell dyscrasias including Waldenstrom's macroglobulinemia and alpha-chain disease, lymphosarcomas, chronic lymphatic leukemia); (2) increased immunoglobulin breakdown and loss (e.g., exudative gastroenteropathies, intestinal lymphangiectasia); and (3) amyloidosis. Based on this classification, the small intestine roentgen features associated with the various immunoglobulin disorders are (1) the sprue pattern, as in hypogammaglobulinemic sprue and in IgA deficient sprue; (2) multiple nodular defects, as in dysgammaglobulinemia and lymphoma; (3) inflammatory changes secondary to giardiasis; and (4) thickening of small intestinal folds, as in amyloidosis, lymphoma, macroglobulinemia, plasma cell dyscrasias, and intestinal lymphangiectasia.

8545 THE SIGNIFICANCE OF BILE ACIDS AND ALDOSTERONE FOR THE ELECTRICAL HYPERPOLARIZATION OF HUMAN RECTUM IN OBESE PATIENTS TREATED WITH INTESTINAL BYPASS OPERATION. *(E.)* Rask-Madsen, J.; Bruusgaard, A.; Munck, O.; Nielsen, M. D.; Worning, H. (Glostrup Hosp., Denmark). *Scand. J. Gastroenterol.* 9(5):417-426, 1974.

The effects of jejunoileal bypass on the rectal potential difference and the transepithelial transport of electrolytes and water in the rectum and colon were investigated in 10 morbidly obese patients (9 women and 1 man, aged 24-46 yr). Transport rates of electrolytes and water were measured pre- and postoperatively by *in vivo* dialysis of rectal fluids and by steady-state perfusion of whole colon. Plasma aldosterone and renin were measured radioimmunochemically, simultaneously with exchangeable sodium and total body potassium, to evaluate whether a state of secondary hyperaldosteronism due to electrolyte derangement existed postoperatively. A semiquantitative determination of fecal bile salts was made after chromatographic separation since di- and trihydroxy bile salts interfere with colonic ion transport. A significant increase in potential difference was noted postoperatively, (from -45 to -64 mV). The mucosa to serosa flux of sodium and net transport rates of chloride and water also increased significantly when physiochemical environments in the rectal lumen were unaffected by the procedures of measurement. However, normal values were obtained when the colon was perfused with isotonic saline. Plasma aldosterone and plasma renin decreased postoperatively in accordance with the findings of potassium depletion. A marked decrease in the concentrations of secondary bile salts (deoxycholic acid and lithocholic acid) was observed also. The hyperpolarization and alterations in transepithelial transport of salt and water in shunt-operated patients are probably not the result of mineralocorticoid stimulation but are probably due to disappearance of dihydroxy bile salts from the colonic lumen.

8546 OBSTRUCTION OF THE DUODENUM BY THE SUPERIOR MESENTERIC ARTERY - DOES IT EXIST IN CHILDREN? *(E.)* Burrington, J. D.; Wayne, E. R. (Children's Hosp., Denver, Colo.). *J. Pediatr. Surg.* 9(5):733-741, 1974.

A series of 20 children (9 boys and 11 girls, aged 1 month to 19 yr) with superior mesenteric artery syndrome was studied. The causes of duodenal compression in these cases included rapid growth without a proportiante weight gain (10); congenital defects (2); esophageal burn (1); weight loss (3, all boys losing weight to qualify for athletic teams); scleroderma (1); spine fusion (1); colitis (1); and leukema (1). Factors predisposing a patient to this syndrome include a high, tight ligament of Trietz, abnormally high position of the third portion of the duodenum, unusual take-off of the superior mesenteric artery from the aorta, and perhaps, the relation of the aorta to the lumbar vertebral bodies. The patient usually has an asthenic build, severe postprandial pain and bloating, and bilestained vomiting early in the disease. Radiological factors include dilatation of the proximal duodenum, obstruction to the flow of barium just to the right of the vertebral column, and diminished gas in the remainder of the bowel. In some of these patients the duodenum crossed at the level of the L_2, but in most the duodenum crossed in the lower, more normal position. In most, the entire 2nd portion of the duodenum was posterior to the vertebral column. Fluoroscopy revealed marked to-and-fro churning by the duodenum with retrograde peristalsis sufficiently vigorous to pass a large bolus of barium back into the stomach. Often lying prone on the left side or assuming the knee-chest position will offer symptomatic relief. If rapid emptying can be achieved by assuming these positions, nonoperative therapy will be sufficient. Findings at operation include the marked dilatation of the 2nd portion of the duodenum with distinct narrowing at the point where the duodenum passes beneath the mesentery through its retroperitoneal attachments, and a tight, rigid tunnel to the right of the spine where the duodenum passes beneath the mesentery. The operation proposed in this series called for removal of the source of entrapment rather than bypassing it and does not involve opening the bowel. The 8 patients on whom this procedure was performed had minimal morbidity and left the hospital eating a normal diet. No gastric ulcers were found in this series.

8547 ULTRASTRUCTURAL CHANGES INDUCED BY BACTERIAL CONTAMINATION OF THE UPPER GUT. *(E.)* Gracey, M.; Papadimitriou, J. (Princess Margaret Children's Hosp., Perth, Australia). *Aust. NZ J. Med.* 4(3):300-301, 1974.

8548 SMALL INTESTINAL IMMUNE DEFICIENCY IN MOUSE GRAFT VS. HOST (GVH) DISEASE. *(E.)* Gold, J. A. (VA Hosp., Palo Alto, Calif.). *Clin. Res.* 22(4):602A, 1974.

8549 INTESTINAL SPECIMEN ROENTGENOGRAPHY: A THREE WAY CORRELATION. *(E.)* Calenoff, L.; Norfray, J.; Poticha, S.; Sherrick, J. C. (Northwestern Mem. Hosp., Chicago, Ill.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 122(2):266-274, 1974.

8550 ETIOLOGY AND MANAGEMENT OF INTESTINAL GAS. *(E.)* Weiss, J. (French-Polyclin. Med. Sch., Long Beach, N.Y.). *Curr. Ther. Res.* 16(9):909-920, 1974.

8551 GASTROINTESTINAL HAEMORRHAGE FROM ECTOPIC GASTRIC MUCOSA LINING A JEJUNAL DIVERTICULUM. *(E.)* Hanley, D. J. (Southmead Hosp., Bristol, England). *Br. J. Clin. Pract.* 28(10):353-355, 1974.

8552 ANTENATAL DIAGNOSIS OF DUODENAL ATRESIA. *(E.)* Houlton, M. C. C.; Sutton, M.; Aitken, J. (Louise Margaret Milit. Maternity Hosp., Aldershot, England). *J. Obstet. Gynaecol. Br. Commonw.* 81(10): 818-821, 1974.

8553 SPORADIC PEUTZ-JEGHERS SYNDROME IN EARLY CHILDHOOD. A DIAGNOSTIC DILEMMA. *(E.)* Yosowitz, P.; Hobson, R.; Ruymann, F. (Walter Reed Army Med. Ctr., Washington, D.C.). *Am. J. Dis. Child.* 128(5):709-712, 1974.

8554 ILEAL BLIND LOOP IN CHILDHOOD. *(E.)* Challacombe, D. N.; Richardson, J. M.; Edkins, S.; Hay, I. F. (Inst. Child Hlth., Univ. Birmingham, England). *Am. J. Dis. Child.* 128(5):719-726, 1974.

8555 COMPLICATIONS OF MECKEL'S DIVERTICULUM IN INFANTS. *(E.)* Meguid, M.; Canty, T.; Eraklis, A. J. (Child. Hosp., Boston, Mass.). *Surg. Gynecol. Obstet.* 134(4):541-544, 1974.

8556 INTESTINAL TUBERCULOSIS IN A CHILD IN AN AFFLUENT SOCIETY. *(E.)* Friedland, G. W.; Filly, R. (Stanford Med. Ctr., Calif.). *Pediatr. Radiol.* 2(3):199-202, 1974.

8557 SMALL BOWEL DILATATION IN EHLERS-DANLOS SYNDROME — AN UNREPORTED GASTROINTESTINAL MANIFESTATION. *(E.)* Harris, R. D. (U.S. Pub. Hlth. Serv. Hosp., Seattle, Wash.). *Br. J. Radiol.* 47(561):623-627, 1974.

8558 PRIMARY HODGKIN'S DISEASE OF THE SMALL BOWEL. *(E.)* Prakash, A.; Sharma, L. K.; Koshal, A. (All-India Inst. Med. Sci., New Delhi). *Int. Surg.* 59(9):488-491, 1974.

8559 PRIMARY TUMOURS OF THE SMALL INTESTINE. *(E.)* Southam, J. A. (Epsom Dist. Hosp., Epsom, England). *Ann. R. Coll. Surg. Engl.* 55(3): 129-133, 1974.

8560 EXTRA-NODAL RETICULUM CELL SARCOMA OF THE TERMINAL ILEUM WITH INTUSSUSCEPTION. *(E.)* Elechi, E. N.; Ali, S. D.; Calhoun, T.; Kurtz, L. H. (District Columbia Gen. Hosp., Washington, D.C.). *J. Nat. Med. Assoc.* 66(5):420-423, 1974.

8561 INTESTINAL CARCINOMA IN THE PEUTZ-JEGHERS SYNDROME. *(E.)* Reid, J. D. (Dept. Pathol., Case Western Reserve Univ., Cleveland, Ohio). *JAMA* 229(7):833-834, 1974.

8562 NO EVIDENCE OF RECURRENCE 7 1/2 YEARS AFTER RESECTION OF A DUODENAL CARCINOMA. *(Ger.)* von Hasselbach, H.; Witte, J. (Sarepta Hosp., Bethel/ Bielefeld, Germany). *Munch. Med. Wochenschr.* 116(43): 1871-1872, 1974.

8563 THE SURGICAL APPROACH TO MORBID OBESITY. *(E.)* Barrocas, A. (U.S. Air Force Hosp., Maxwell, Ala.). *Am. J. Proctol.* 25(4):62-74, 1974.

8564 THE TREATMENT OF MALIGNANT OBESITY. *(E.)* Lipshutz, S. (no affil.). *J. Abdom. Surg.* 16(11):324-326, 1974.

8565 A MODIFICATION OF THE JEJUNOILEAL BYPASS. *(E.)* Pace, W. G.; Large, J. W.; Thomford, N. R. (Ohio State Univ. Coll. Med., Columbus). *Am. J. Surg.* 128(5):631-632, 1974.

8566 TEN YEARS CLINICAL EXPERIENCE WITH PARTIAL ILEAL BYPASS IN MANAGEMENT OF THE HYPERLIPIDEMIAS. *(E.)* Buchwald, H.; Moore, R. B.; Varco, R. L. (Univ. Minnesota Hosp., Minneapolis). *Ann. Surg.* 180(4):384-392, 1974.

8567 EARLY POSTOPERATIVE SMALL BOWEL OBSTRUCTION. *(E.)* Sykes, P. A.; Schofield, P. F. (Roy. Infirm., Manchester, England). *Br. J. Surg.* 61(8): 594-600, 1974.

8568 BAKER'S STITCHLESS PLICATION IN THE TREATMENT OF RECURRING INTESTINAL OBSTRUCTION. *(E.)* Quiroz, J. (no affil.). *J. Abdom. Surg.* 16(11):310-313, 1974.

8569 THE EVALUATION OF A COMPETENT ILEOCOLONIC ANASTOMOSIS. *(E.)* Copeland, E. M.; McBride, C. M. (M.D. Anderson Hosp., Houston, Tex.). *South. Med. J.* 67(9):1036-1040, 1974.

8570 BREAKDOWN OF SMALL-BOWEL ANASTOMOSES AFTER PELVIC RADIOTHERAPY. *(E.)* Wellwood, J. M.; Jackson, B. T.; Bates, T. D. (St. Thomas's Hosp., London, England). *Ann. R. Coll. Surg. Engl.* 54(6): 306-308, 1974.

8571 THE IMPORTANCE OF ADEQUATE NUTRITION IN CLOSURE OF SMALL INTESTINAL FISTULAS. *(E.)* Himal, H. S.; Allard, J. R.; Nadeau, J. E.; Freeman, J. B.; Maclean, L. D. (Roy. Victoria Hosp., Montreal, Canada). *Br. J. Surg.* 61(9):724-726, 1974.

8572 IMPORTANCE OF LUMINAL NUTRITION FOR INTESTINAL ADAPTATION FOLLOWING SMALL BOWEL RESECTION. *(E.)* Dowling, R.; Feldman, E. J.; MacNaughton, J.; Peters, T. J. (Roy. Postgrad. Med. Sch., London, England). *Digestion* 10(3):216-217, 1974.

See also, 8246, 8448, 8450, 8453, 8469, 8492, 8499, 8534, 8593, 8638, 8639, 8642, 8646, 8654, 8726, 8817, 8846, 8849, 8851, 8863, 8874, 8882, 8904, 8905.

SMALL INTESTINE

Malabsorption

8573 FAT ABSORPTION IN INFANTS OF BIRTH WEIGHT LESS THAN 1,3000 gm. *(E.)* Katz, L.; Hamilton, J. R. (Fac. Med., Univ. Toronto, Canada). *J. Pediatr.* 85(5):608-614, 1974.

Fat absorption was studied during the first 2 months of life in 15 infants with birth weights less than 1300 g. The actual fat content of the formula fed to the infants at the standard dilution was 3.70 ± 0.31 g/100 ml. The capacity to absorb fat was mildly impaired at 2 weeks (75% of intake) but was significantly improved at 2 months (88.4% of intake), approaching that of the adult. In 5 infants given p.o. calcium supplements (147 mg/kg/day) starting at age 3 weeks, fat excretion at 6-8 weeks was significantly greater than in nonsupplemented infants. At 2 weeks and 2 months, a fatty meal was administered through stomach tube and specimens of duodenal juice were obtained; the meal contained 2.5 g corn oil or triolein, 0.25 g lecithin, and 1 g/100 ml polyethylene glycol in a volume of water to equal the routine feeding. The pH of most samples fell within a narrow alkaline range. Polyethylene glycol and bilirubin concentrations were similar in both collection periods. Total intraluminal bile salt concentrations were generally low at 2 weeks but had increased at 2 months; maximum postprandial bile salt concentrations were significantly correlated with fat excretion. Glycine conjugates were minimal at 2 weeks and greatly increased at 2 months. Free bile acids were scarely detectable in either period, while lipase activity and mono- and diglycerides were consistently present in duodenal contents. Three infants had appreciable quantities of triglycerides at 2 weeks. The data indicate the need for care in determining the appropriate dietary fats and fat-soluble vitamins for early nutirition of low birth weight-infants.

8574 THE EXPERIMENTAL PRODUCTION OF VITAMIN B_{12} DEFICIENCY IN THE BABOON (Papio cynocephalus). A 2-YEAR STUDY. *(E.)* Siddons, R. C. (Wellcome Trust Res. Lab., Nairobi, Kenya). *Br. J. Nutr.* 32(2):219-228, 1974.

The development of vitamin B_{12} deficiency, as indicated by the serum and liver vitamin B_{12} levels and the excretion of methylmalonic acid, was studied over a 2-yr period in 15 male baboons (*Papio cynocephalus*) given a diet deficient in vitamin B_{12}. The effects of partial hepatectomy and the inclusion of either ampicillin or sodium propionate in the diet on the rate of development of the deficiency were also studied. Basal serum B_{12} levels in animals fed primarily a vegetarian diet were less than 100 ng/liter and the mean liver vitamin B_{12} concentration was 0.56 μg/g. Similar serum and liver vitamin B levels were found in baboons given a purified diet supplemented with 1 μg vitamin B_{12}/day, and marked increases in the serum and liver vitamin B_{12} levels occurred when the daily intake was increased to 2 μg. The serum vitamin B_{12} levels decreased to less than 20 ng/liter in all baboons given a vitamin B_{12}-deficient diet. The liver vitamin B_{12} concentration also decreased in all baboons given a deficient diet. At 9 months the lowest levels (0.20 μg/g) were found in partially hepatectomized baboons but subsequently baboons given the diet containing ampicillin had the lowest levels (0.11 μg/g). The excretion of methylmalonic acid after a valine load was found to be inversely related to the liver vitamin B_{12} concentration. In the early part of the study, partially hepatectomized baboons excreted the highest amount but subsequently baboons given a diet containing ampicillin excreted the highest amount. Increased foriminoglutamic acid excretion after a histidine load was observed in 2 baboons given a vitamin B_{12}-deficient diet and in both baboons the liver folic acid concentration was low. No hematological or neurological symptoms of the vitamin B_{12} deficiency were observed.

8575 INTRACTABLE MALABSORPTION WITH A FLAT JEJUNAL MUCOSA AND SELECTIVE IgA DEFICIENCY: A CASE REPORT WITH IMMUNOLOGICAL AND AUTORADIOGRAPHIC STUDIES. *(E.)* Anderson, K. E.; Finlayson, N. D. C.; Deschner, E. E. (Cornell Univ. Med. Ctr., New York, N.Y.). *Gastroenterology* 67(4):709-716, 1974.

The case history of a 13-yr-old boy with selective immunoglobuoin A (IgA) deficiency, flat jejunal mucosa, and fatal malabsorption is reported. No IgA was detectable in serum, saliva, or jejunal fluid. The patient did not respond to a gluten-free diet, to a course of tetracycline, neomycin, sulfisoxazole, and metronidazole, or to supplementary p.o. medium-chain triglycerides, amino acids, and pancreatic enzymes. The mucosal lesion was the only basis demonstrated for malabsorption; giardiasis and bacterial overgrowth were not present. I.v. infusion of fresh-frozen plasma (> 10 cc/kg) increased serum IgA levels to 14.5-16.00 mg/100 ml over a 30-day period. Thereafter, the IgA level declined, deterioration resumed and the patient eventually died of an air embolus after insertion of a subclavian venous catheter. Investigation of jejunal mucosa after incubation with ^{3}H-thymidine showed very rapid proliferation of the small intestinal epithelium, as in gluten-sensitive enteropathy, with active mitosis and DNA synthesis not only in the crypts but also on the surface mucosa. This case indicates that a patient with gluten enteropathy and selective IgA deficiency may not respond to plasma infusions.

8576 TRANSIENT MALABSORPTION IN INFECTIOUS MONONUCLEOSIS: CASE REPORT. *(E.)*

Butler, M. L.; Carlton, L.; DeGreen, H. P.; Teplick, S. K.; Metz, J. R. (Tripler Army Med. Ctr., Honolulu, Hawaii). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 122(2):241,244, 1974.

A 19-yr-old boy with infectious mononucleosis and diarrhea, usually preceded by abdominal cramps, was found to have malabsorption. Clinical and biochemical findings included: d-xylose excretion (25 g oral load), 2 g in 5 hr; 72 hr stool fat, 32 g; stools, guaiac-negative, negative for ova and parasites; duodenal aspirate, no pathogens. Roentgenology showed thickening of the mucosal folds throughout the small bowel. A jejunal biopsy showed blunting of some villi with infiltration of the lamina propria by atypical lymphocytes. Over a 16-week period the diarrhea was resolved without drug or dietary therapy; all parameters of small bowel function returned to normal, and a repeat biopsy was normal.

8577 HL-A8 AND HAPLOTYPE HL-A1-8 IN COELIAC DISEASE. *(E.)*

Ludwig, H.; Granditsch, G.; Polymenidis, Z. (Immunol. Inst., Univ. Vienna, Austria). *J. Immunogenet.* 1(2):91-97, 1974.

The transmission of human lymphocytes antigen-8 (HL-A8) and HL-A1 and of the haplotype HL-A1-8 within families with celiac children was investigated by segregation analysis. The study involved 54 patients (21 boys and 33 girls, aged 6 month to 14 yr with one aged 23 yr), 30 (56%) with HL-A8 and 31 (57%) with HL-A1. Corresponding percentages for the control group of 240 unrelated individuals were 16 and 29%, resp. The increase in HL-A1 frequency was attributed to linkage disequilibrium between the genes involved. The haplotype HL-A1-8 frequency was also significantly increased in celiac children. A slightly lower frequency of HL-A3 in the 1 locus and a low frequency of HL-A7 in the 2 locus in celiac children may have been a consequence of the high frequency elevation of HL-A8 and HL-A1 leading to reduced frequencies of other HL-A antigens. In family studies, 90 parents and 34 healthy siblings of 47 celiac children had HL-A antigens. In all but 2 of these cases the parents and siblings were free of clinical symptoms. Haplotype HL-A1-8 was found in 22 of these 47 (47%) celiac children. In the control group the haplotype HL-A1-8 frequency was 6.7%. Tissue typed siblings of the celiac patients, though free of clinical symptoms, possessed haplotype HL-A1-8 in 35%. Parents also had increased haplotype HL-A1-8: 35.5% in mothers and 24.4% in fathers. Segregation analysis was performed in families where 1 parent was heterozygous for an antigen and the other was negative. This analysis revealed a deviation from the expected distribution of the single antigens HL-A8 and HL-A1 in celiac children while an almost even distribution of these antigens was noted in healthy siblings. In the few haplotypes frequent enough to be included in the segregation analysis, a similar deviation from the expected distribution was found for HL-A1-8 in celiac patients again in contrast to the almost even distribution observed in their healthy siblings. These results indicate a genetic mechanism involved in the pathogenesis of celiac disease. The gene(s) partly responsible for the development of the disease seem preferentially linked to HL-A8.

8578 NECROPSY STUDIES ON ADULT COELIAC DISEASE. *(E.)*

Thompson, H. (Gen. Hosp., Birmingham, England). *J. Clin. Pathol.* 27(9):710-721, 1974.

The distribution of mucosal changes in adult celiac disease was studied in 24 cases within 4 hr of death. Six patients on a gluten-containing diet showed a flat mucosa in the jejunum, convolutions and ridges in the middle 1/3 of the small intestine, and digitate and leaf villi in the distal 1/3. In 1 case, flat mucosa involved 2/3 of the jejunum and low convolutions were present in the distal 1/3. Of 18 patients treated with a gluten-free diet, 11 had responded well clinically and histologically and 6 of these had no evidence of flat mucosa. Recticulum cell sarcoma was demonstrated in 10 patients, including 3 who had been on a gluten-free diet for 4, 9, and 15 yr, resp., with a good response. The primary site was the small intestine in 7 cases (jejunum 2, mid-ileum 4, terminal ileum 1), stomach in 1, and lymph nodes in 2. There were 7 cases each of multiple lesions in the gastrointestional tract and of metastases. Ulceration of the small intestine was present in 5 cases and was a fatal complication in 2. Other complications of celiac disease were nonobstructing mucosal diaphragms (4 cases), brownish pigmentation of the small intestine (9), fatal volvulus (2), ulcerative colitis (1), lymphoreticular atrophy (10), nonspecific recurrent skin eruption (2), and bronchopneumonia (11). The high incidence of neoplasia in this series supports the view that malignancy is a fatal complication of adult celiac disease. In particular, the 10 cases of recticulum cell sarcoma suggest a defect in the immune surveillance mechanism or viral oncogenesis.

8579 COELIAC DISEASE AND MALIGNANCY. *(E.)*

Barry, R. E. (Roy. Infirm., Bristol, England). *Tijdschr. Gastroenterol.* 16(1):23-34, 1973.

Jejunal mucosal dynamics were studied in 18 patients with subtotal villous atrophy who presented with malabsorption. All had been diagnosed as having celiac disease. Ten of the patients responded to a gluten-free diet while 8 failed to respond. Compared with the gluten-responsive group, the gluten-nonresponsive group had a markedly decreased epithelial cell turnover rate and a significant decrease in mucosal thickness. The mitotic index was also lower in the nonresponsive group, but the difference was not significant. Of the 8 patients who did not respond to a gluten-free diet, 2 were found to have lymphosarcoma of multifocal origin arising in the small intestine, 2 developed primary reticulosarcomas after their small intestine mucosal architecture had returned to normal following prednisone treatment, 1 died of a primary peritonitis, and 1 developed recurrent anemia. Laparotomy in the last case revealed focal reticulum cell-type malignancy in mesenteric lymph nodes. The results indicate that the mechanism which produces mucosal abnormality in gluten-nonresponsive patients with subtotal villous atrophy is different from that of uncomplicated celiac disease. The association of subtotal villous atrophy with a low epithelial cell turnover suggests a grave prognosis.

8580 COMPARISON OF FREE AMINO ACIDS AND DIPEPTIDE ABSORPTION IN THE JEJUNUM OF SPRUE PATIENTS. *(E.)* Adibi, S. A.; Fogel, M. R.; Agrawal, R. M. (Montefiore Hosp., Pittsburgh, Pa.). *Gastroenterology* 67(4):586-591, 1974.

Jejunal absorption of free glycine and glycylglycine were measured with a marker perfusion technique in 5 healthy men (aged 20-26 yr) and 3 women (aged 25-72 yr) with an intestinal lesion resembling sprue. Absorption rates of both free glycine and glycylglycine were markedly reduced in the sprue patients, the reduction being more severe for free glycline than for glycylglycine (15-fold decrease *versus* 4-fold). The differences between controls and sprue patients were many times greater than the individual variations due to differences in age, sex, and body weight. In each patient, the glycine absorption rate was significantly greater from a test solution containing 30 mM glycylglycine than from a test solution containing a similar amount of glycine in the free form (100 mM). In 2 additional sprue patients (a 31-yr-old man and a 16-yr-old girl), the jejunal absorption rates of glycylglycine and glycyl-L-leucine were compared. Although the absorption rates were markedly reduced compared with control values, the reduction was similar for both dipeptides. Two patients improved on a gluten-free diet but 2 developed malnutrition and required a course of steroid therapy. Repeat studies on 1 of the latter showed that posttreatment absorption rates of free glycine and glycylglycine were within the normal range. These results indicate that dipeptide is superior to free amino acid as a substrate for amino acid absorption even when the membrane transport is markedly reduced. Further, the reduction in transport involves equally a dipeptide with a poor potential (glycylglycine) and a dipeptide with an excellent potential (glycyl-L-leucine) for hydrolysis by mucosal enzymes.

8581 FOLIC ACID AND HEXOSE ABSORPTION IN SPRUE. *(E.)* Gerson, C. D.; Cohen, N.; Brown, N.; Lindenbaum, J.; Hepner, G. W.; Janowitz, H. D. (Mt. Sinai Sch. Med., New York, N.Y.). *Am. J. Dig. Dis.* 19(10):911-919, 1974.

Folic acid (pyteroylglutamic acid, PGA) absorption and hexose absorption in 7 patients with celiac sprue and 2 with tropical sprue were studied with a triple-lumen intestinal perfusion technique. Folate malabsorption was demonstrable only during perfusion with glucose or galactose and saline, not with saline alone. In 5 patients with untreated celiac sprue, PGA (25 ng/ml) absorption ranged from 5.6-16.7% with saline perfusion and 0-13.3% with saline and hexose. Three of 5 patients perfused with hexose + saline had net secretion of water and sodium into the lumen, while 3 of 4 perfused with saline alone had net secretion of water and either net secretion or almost zero net flux of sodium. In 5 controls without gastrointestinal disease, sugar had a stimulating effect on PGA and on water and sodium transport. Glucose absorption, measured in 3 patients, ranged from 0-18.9% compared with a mean of 86.0% for 11 controls. Galactose absorption was 5% in the 2 patients tested compared with control values of 53, 64, and 83%. In 2 patients treated with a gluten-free diet for 6 and 8 yr, resp., the response to glucose was normal: PGA, water, sodium, and glucose absorption were in the control range. The 2 patients with tropical sprue had a milder absorptive defect than patients with celiac sprue. Reduced transport of water, sodium, and PGA (100 ng/ml) was evident only during glucose perfusion even though glucose was better absorbed than in celiac sprue. Treatment of tropical sprue with tetracycline (250 mg 4 times/day) and folic acid (5 mg/day) resulted in partial improvement in 1 patient, while treatment for 6 months in the other restored normal absorptive function. Hexose absorption was significantly correlated with PGA absorption when treated subjects were included, but not when treated subjects were excluded.

8582 MALABSORPTION OF THIAMIN IN FOLATE-DEFICIENT RATS. *(E.)* Howard, L.; Wagner, C.; Schenker, S. (Vanderbilt Univ. Sch. Med., Nashville, Tenn.). *J. Nutr.* 104(1):1024-1032, 1974.

8583 INTESTINAL ABSORPTION OF CYSTINE AND CYSTEINE IN NORMAL HUMAN SUBJECTS AND PATIENTS WITH CYSTINURIA. *(E.)* Silk, D. B. A.; Perrett, D.; Stephens, A. D.; Clark, M. L.; Scowen, E. F. (St. Bartholomew's Hosp., London, England). *Clin. Sci. Mol. Med.* 47(4):393-397, 1974.

8584 SMALL BOWEL DISEASE AND SERUMGASTRIN. *(E.)* Gillberg, R.; Stockbrugger, R.; Lundquist, G.; Dotewall, G. (Sahlgrenska Hosp., Goteborg, Sweden). *Scand. J. Gastroenterol.* 9(27):43, 1974.

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8586 IRON-BINDING PROTEINS IN THE DUODENAL MUCOSA OF MICE WITH SEX-LINKED ANEMIA. *(E.)* Edwards, J. A.; Hoke, J. E. (Dept. Med., State Univ. New York, Buffalo). *Clin. Res.* 22(4):635A, 1974.

8587 PHAGOCYTOSIS, BACTERICIDAL ACTIVITY AND NITROBLUE TETRAZOLIUM REDUCTION BY THE RABBIT NEUTROPHIL IN PROTEIN MALNUTRITION. *(E.)* Bhuyan, U. N.; Mohapatra, L. N.; Ramalingaswami, V. (All-India Inst. Med. Sci., New Delhi). *Indian J. Med. Res.* 62(1):42-52, 1974.

8588 INHIBITORY EFFECT OF EGGS ON VITAMIN B_{12} ABSORPTION, ASSESSMENT OF B_{12} ABSORPTION BY AN OVALBUMIN-$CO^{57}B_{12}$ TEST. *(E.)* Doscherholmen, A.; McMahon, J.; Ripley, D. (Veterans Hosp., Minneapolis, Minn.). *Clin. Res.* 22(4):635A, 1974.

8589 INHIBITION OF INTESTINAL ABSORPTION OF FOLIC ACID BY PHENYTOIN. *(E.)* Elsborg, L. (Univ. Dept. Med. II, Aarhus Amtssygehus, Denmark). *Acta Haematol.* 52(1):24-28, 1974.

8590 OBSERVATIONS ON THE EFFECT OF VINBLASTINE AND MUSTINE ON THE SMALL INTESTINE. *(E.)* Tibbutt, D. A.; Holt, J. M. (Radcliffe Infirm., Oxford, England). *Br. Soc. Haematol.* 28(1):150, 1974.

8591 DIFFUSE PLASMA CELL INFILTRATION OF THE SMALL INTESTINE WITH MALABSORPTION ASSOCIATED TO IgA MONOCLONAL GAMMAPATHY. *(E.)* Chantar, C.; Escartin, P.; Plaza, A. G.; Corugedo, A. F.; Arenas, J. I.; Sanz, E.; Anaya, A.; Bootello, A.; Segovia, J. M. (Sch. Med., Univ. Autonoma, Madrid, Spain). *Cancer* 34(5):1620-1630, 1974.

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8595 ABDOMINAL LYMPHOMA WITH MALABSORPTION. *(E.)* Eidelman, S. (Rambam Univ. Hosp., Haifa, Israel). *JAMA* 229(8):1103-1104, 1974.

8596 QUANTITATIVE MEASUREMENT OF LACTOSE MALABSORPTION. *(E.)* Bond, J. H.; Levitt, M. D. (VA Hosp., Minneapolis, Minn.). *Clin. Res.* 22(4): 601A, 1974.

8597 LACTOSE TOLERANCE IN MEXICAN AMERICAN CHILDREN. *(E.)* Woteki, C. E.; Young, E. A.; Weser, E. (Univ. Texas Health Sci. Ctr., San Antonio). *Clin. Res.* 22(4):636A, 1974.

8598 LACTOSE INTOLERANCE IN ADULTS. *(Fr.)* Loiselet, J.; Jarjouhi, L. (French Fac. Pharm., Beirut, Lebanon). *J. Med. Liban.* 27(3):247-256, 1974.

8599 PRIMARY LACTASE DEFICIENCY IN GREEK ADULTS. *(E.)* Kanaghinis, T.; Hatzioannou, J.; Deliargyris, N.; Danos, N.; Zografos, N.; Katsas, A.; Gardikas, C. (Evangelismos Hosp., Athens, Greece). *Am. J. Dig. Dis.* 19(11):1021-1027, 1974.

8600 HEREDITARY TRANSCOBALAMIN II DEFICIENCY: CLINICAL FINDINGS IN A NEW FAMILY. *(E.)* Hitzig, W. H.; Dohmann, U.; Pluss, H. J.; Vischer, D. (Dept. Pediatr., Univ. Zurich, Switzerland). *J. Pediatr.* 85(5):622-628, 1974.

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8602 WHIPPLE DISEASE. LIGHT AND ELECTRON MICROSCOPY STUDY. *(E.)* Lamberty, J.; Varela, P. Y.; Font, R. G.; Jarvis, B. W.; Coover, J. (VA Hosp., New Orleans, La.). *Arch. Pathol.* 98(5):325-330, 1974.

8603 GALL BLADDER EMPTYING AND ITS RELATION TO ENDOGENOUS CHOLECYSTOKININ LEVELS IN COELIAC DISEASE. *(E.)* Low-Beer, T.; Harvey, R.; Nolan, D.; Davies, R.; Read, A. (Bristol Roy. Infirm., England). *Eur. J. Clin. Invest.* 4(5):327, 1974.

See also, 8145, 8175, 8450, 8465, 8504, 8543, 8544, 8547, 8888, 8911.

LARGE INTESTINE

8604 CONTROLLED CLINICAL TRIAL OF MEPIPRAZOLE IN IRRITABLE BOWEL SYNDROME. *(E.)* Dotevall, G.; Groll, E. (Sahlgren's Hosp., Univ. Goteborg, Sweden). *Br. Med. J.* 4(5935):16-18, 1974.

The clinical effect of the psychotropic drug, mepiprazole (5 mg), which has pronounced tranquillizing properties but no sedative action, in the treatment of the irritable bowel syndrome was studied in a double-blind cross-over trial involving 22 patients

(11 women and 11 men, aged 22-68 yr). The duration of symptoms ranged from 2-30 yr, averaging 7 yr. The trial included 2 treatment periods of 4 weeks each under either placebo or active drug. Three patients withdrew, 1 due to vertigo induced by the drug. Mild side effects, noted in 4 others who did complete the trial, included headaches, vertigo, nausea and increased irritability. During the first week of the trial, an almost identical response to placebo and active drug was noted. After 2 weeks, however, the active group alone continued to improve. After 4 weeks the difference in response was quite obvious. After the cross-over of the active drug with placebo, the improved state continued for a fortnight. However, after that time, the symptoms worsened, giving evidence that the placebo was ineffective compared with mepiprazole. This also demonstrates that the irritable bowel syndrome is a chronic condition which can be helped, but not cured, by treatment.

8605 MEGACOLON: SPECIAL DIAGNOSTIC AND THERAPEUTIC FEATURES.

(E.) Tobon, F.; Schuster, M. M. (Johns Hopkins Univ. Sch. Med., Baltimore, Md.). *Johns Hopkins Med. J.* 135(2):91-105, 1974.

Two types of megacolon exist: 1) Hirschprung's disease, associated with an aganglionic colon segment, and 2) idiopathic megacolon in which nerve cells can be demonstrated histologically. These two entities were compared in a review of 100 cases of megacolon seen over a 10-yr period. Of these, 40 were Hirschprung's disease and 60 were idiopathic. Of the diagnostic tests used, manometry was the most accurate (100%). Histological appearance was more helpful in diagnosing idiopathic megacolon, whereas barium enema was more helpful with respect to Hirschprung's disease. The ratio of males to females was 2:1 with idiopathic and 9:1 with Hirschprung's megacolon. The familial incidence of Hirschprung's disease was 9.5% and, unlike previously reported, familial involvement occurred among males rather than females. In addition, the length of aganglionic colon did not tend to be similar in involved siblings. Mortality tended to be highest when there was familial involvement and did not depend on the length of the aganglionic segment. Down's syndrome occurred in 5.4% of the cases of Hirschprung's disease. Idiopathic megacolon showed no pattern of genetic predisposition. Clinically, patients with Hirschprung's disease experienced constipation during the 1st yr of life more frequently (96%) than did idiopathic megacolon patients (57%). Encopresis was present in 45% of the idiopathic megacolon patients but in none of the Hirschprung's patients. Personality disorders were present most frequently (63%) in patients with idiopathic megacolon plus encopresis, but generally were not seen in patients without encopresis or in patients with Hirschprung's disease. Sphincter tone tended to be normal or increased in patients with Hirschprung's disease but normal or decreased in idiopathic megacolon subjects. Stool could be detected clinically in the rectal ampulla of 94% of the patients with idiopathic disease but in only 50% of those with Hirschprung's disease.

8606 STERCORAL ULCERATION AND PERFORATION OF THE SCLERODERMATOUS COLON: REPORT OF TWO CASES AND REVIEW OF THE LITERATURE.

(E.) Robinson, J. C.; Teitelbaum, S. L. (Jewish Hosp. St. Louis, Mo.). *Dis. Colon Rectum* 17(5):622-632, 1974.

Two patients with scleroderma are reported whose deaths were due to colonic perforation associated with stercoral ulcers. The admitting diagnosis in a 54-yr-old woman presenting with abdominal pain and constipation was viral hepatitis and scleroderma. Two days after administration of a noneffective retention enema, the patient went into shock and became oliguric. At autopsy, the large intestine from cecum to mid-descending colon was markedly dilated and filled with feces. The transverse and proximal sigmoid colon were necrotic along the antimesenteric border; superficial ulcers were present throughout the left colon; and the sigmoid colon contained 2 perforations (1-2 cm in diameter) through which fecal matter was protruding. On histological examination, the epidermis was atrophic and the dermis collagenized. The ulcerated portions of the colon showed mucosal necrosis and marked atrophy of the true muscularis. The sigmoid colon at the site of perforation showed acute inflammation and necrosis of the wall. Mesenteric blood vessels near the perforation showed inflammatory changes, thrombosis, and destruction of the vessel wall. In a 70-yr-old woman, the admitting diagnosis was probable hernia with obstruction and scleroderma; her symptoms included abdominal pain, nausea, and vomiting. X-rays showed a severely impacted colon which was unresponsive to laxatives, enema, or stimulation. Pseudodiverticula were apparent on barium enema examination. Two weeks prior to death signs of sepsis appeared although blood cultures did not yield bacterial growth. At autopsy, fibrous lesions were present between the spleen and splenic flexure. This portion of the colon was markedly dilated and contained numerous stercoral ulcers up to 1 cm in diameter. The bowel wall was perforated at the point of splenic adhesions and impacted feces were present throughout the colon, particularly distal to the rend. Histologic findings included atrophic epidermitis, collagenized dermis, and severe atrophy of almost all the muscularis propria. The colon was ulcerated and inflamed in the vicinity of the perforation; the residual bowel wall underlying the ulcerated areas was infiltrated by bands of collagen. The frequency of colonic involvement in patients with scleroderma suggests a predisposition to colonic rupture. The importance of preventing constipation in these patients is stressed, as is the need of laparotomy to relieve prolonged obstipation.

8607 SPONTANEOUS SPIROCHETE INFESTATION IN THE COLONIC MUCOSA OF HEALTHY MEN.

(E.) Minio, F.; Tonietti, G.; Torsoli, A. (2nd Med. Clin., Univ. Rome, Italy). *Rend. Gastroenterol.* 5 (3):183-195, 1973.

Ultrastructural studies of the colonic mucosa from 10 apparently healthy male volunteers (aged 24-40 yr) revealed the presence of spirochetes in the colonic lumen and in contact with the superficial and cryptic cells in 4 biopsies (both ascending and descending large bowel portions) from 2 of the subjects. The spirochetes were found in the hairy coat (between the microvilli and within the epithelial cells), the intercellular spaces, and the lamina propria. The infested epithelial cells often showed non-specific alterations such as interruption of the apical plasma membrane, swelling of mitochondria, and degenerative changes of cytoplasmic areas. In the lamina propria, some of the spirochetes were free while others were phagocytosed by macrophages. Structures resembling spirochetes in shape and size were occasionally contained in the capillary walls. Microorganisms resembling *Escherichia coli* were also occasionally observed in contact with the surface epithelium, though not within the epithelial cells or the lamina propria. A scarcity of microorganisms within the cryptic lumens is possibly due to a local accumulation of mucus which might prevent spirochetes from entering into the crypts.

8608 PNEUMATOSIS CYSTOIDES INTESTINALIS TREATED BY OXYGEN BREATHING. *(E.)* Hoflin, F.; van der Linden, W. (Central Hosp., Ostersund, Sweden). *Scand. J. Gastroenterol.* 9(5):427-430, 1974.

The use of oxygen breathing therapy to successfully treat 2 cases of pneumatosis cystoides intestinalis, a disease characterized by gas-filled cysts in the wall of the intestine, is described. Both patients (a 52-yr-old woman and a 60-yr-old man) had a past history of pulmonary disorders, including bronchial asthma, a common feature of the condition. In both cases the cysts were confined to the colon. Gas analysis of the contents of the cysts showed them to contain a high percentage of hydrogen (up to 20%). Both patients were successfully treated with oxygen breathing therapy (68-72% oxygen) for 5 days. This treatment resulted in the complete disappearance of all roentgenographic and sigmoidoscopic evidence of the disease as well as improvement in the clinical condition of the patients. Neither patient has exhibited relapse thus far. Although the pathogenesis of the condition is not clear, the association with asthma seems to be a common feature of the disease; an allergy could possibly serve as their common basis.

8609 PROBLEMS IN THE DIAGNOSIS OF DIVERTICULITIS IN THE YOUNG. *(E.)* Kim, U.; Dreiling, D. A. (Mt. Sinai Sch. Med., City Univ. New York, N.Y.). *Am. J. Gastroenterol.* 62(2):109-115, 1974.

The correct diagnosis of sigmoid diverticulitis in 5 men (aged 24-37 yr) was delayed because of their age and because the typical radiologic features of the disease were not seen in 3 of the 5 cases. In 1 patient presenting with perforated diverticulitis, barium enema after transverse loop colostomy with drainage of a pericolic abscess showed multiple diverticula in the sigmoid as well as descending colon. Elective sigmoid resection was based on a diagnosis of sigmoid diverticulitis made 5 yr earlier. Barium enema examination in the 2nd case showed multiple diverticulosis and diverticulitis with possible intramural abscess formation of the sigmoid colon. Sigmoid resection and end-to-end anastomosis with complementary diverting transverse colostomy was done. In the 3rd patient, preoperative emergency gastrografin enema showed a segment of the sigmoid colon in spasm. No other pathology was evident except for signs of extrinsic compression on the colon. Emergency laparotomy revealed sigmoid diverticulitis with a ruptured pericolic abscess, but after a loop transverse colostomy with drainage of the abscess cavity, barium enema showed a normal colon with the exception of an old walled-off perforation. A sigmoid resection was done. The 4th patient underwent a transverse colostomy and drainage after emergency laparotomy showed sigmoid diverticulitis with pericolic abscess. A postcolostomy enema showed extravasation of the dye from the sigmoid colon without other features of diverticular disease; repeat barium enema 1 month later revealed a persistant sinus tract. A perforated sigmoid diverticulum, walled-off by adjacent loops of small intestine, was found at laparotomy and treated by sigmoid resection. The 4th patient's history included 1 diverting transverse colostomy for acute sigmoid diverticulitis and another for a colovesical fistual. Laparotomy demonstrated a markedly thickened sigmoid colon with chronic inflammatory lesions and a fistulous tract between the lower sigmoid colon and posterior wall of the bladder. The patient underwent a high anterior resection with closure of the fistulous opening. These cases indicate that diverticular colonic disease in young patients requires a more aggressive surgical approach.

8610 DIVERTICULAR DISEASE. POSSIBLE CORRELATION BETWEEN LOW RESIDUE DIET AND RAISED INTRACOLONIC PRESSURES IN THE RABBIT MODEL. *(E.)* Hodgson, J. (Bronx VA Hosp., N.Y.). *Am. J. Gastroenterol.* 62 (2):116-123, 1974.

Rabbits fed a low-residue diet for 4 months as a model for diverticular disease developed a contracted colon with raised intraluminal pressures and temporary intertenial diverticula in response to neostigmine (0.05 mg/kg i.v.). Rabbits fed on a normal high-residue laboratory diet did not develop such changes. Rabbits on the standard diet had a mean fecal weight of 87.3 g/day while rabbits on the low-residue diet had a mean daily fecal weight of only 2.7 g. Transit time was 24 hr on the normal diet and 48 hr on the low-residue diet. It is suggested that in low-residue states, the intracolonic lumen has to be reduced to control a low fecal volume; without colonic narrowing and raised intracolonic pressure, diarrhea may occur. With a high-fecal residue, it would only be necessary for a wide diameter colon to exert minimal pressure for control to be achieved. In man, maintenance of the intracolonic lumen to control a low-residue fecal stream might lead to colonic muscle thickening, shortening, and diverticula formation.

8611 MOTILITY EFFECTS OF OPERATIONS PERFORMED FOR DIVERTICULAR DISEASE. *(E.)* Smith,

A. N.; Kirwan, W. O.; Shariff, S. (Dept. Clin. Surg., Univ. Edinburgh, Scotland). *Proc. R. Soc. Med.* 37 (10):1041-1043, 1974.

Control subjects and patients with uncomplicated diverticular disease of the colon were studied on their habitual diet before and after the addition of 20 g of unprocessed bran. A study was also made using patients who underwent either myotomy or resection of the pelvic colon for diverticular disease. There was no difference in basal motility between normals and patients before or after myotomy. Colonic activity had been significantly increased after all forms of stimulation in diverticular disease, with the greatest effect occurring after prostigmine. These responses were reduced to normal levels by myotomy. Resection of the sigmoid colon did not restore the inherent abnormality of the large bowel muscle to normal. Myotomy and resection patients were followed for 3 yr. A fall in the mean motility index occurred during the 1st yr following myotomy, but over the total period there was considerable return in the mean pressure activity. In contrast, the motility index after colon resection rose to levels very slightly above those recorded before operation. In comparing the effects of bran in normal subjects and patients, the transit time was significantly reduced in the latter. Stool weight was increased by an average of 63 g in normal subjects and 17 g in patients. Bran therapy did not alter the basal motility in patients, but the response to prostigmine fell by 50%. Thus there seems to be a marked diminution in response to motor stimuli in patients with diverticular disease who are fed bran. Intraluminal pressure in myotomy patients fed bran fell and remained low compared to patients treated by resection and bran. The continuing high pressure found in patients after resection suggests that these patients could repeat the cycle of events which originally promoted the development of the diverticula. The return of intraluminal pressure after myotomy is gradual, approximately 60% at 3 yr and almost complete at 5 yr. This rise can be counteracted by keeping the patient on bran prophylactically. The failure of resection to change intraluminal pressure can also be reversed by bran. Myotomy, which initially effectively lowers the intraluminal pressure, emphasizes the importance played by the circular muscle of the pelvic colon in diverticular disease.

8612 DIET AND DIVERTICULAR DISEASE. *(E.)* Parks, T. G. (Dept. Surg., Queen's Univ., Belfast, Northern Ireland). *Proc. R. Soc. Med.* 67(10):1037-1040, 1974.

Epidemiological studies confirm that diverticular disease is not racial in origin. Rather, such studies show that if a community eats a diet which is depleted of cereal fiber, diverticular disease will become relatively common within 30 yr. The prevalence of diverticular disease in Western civilizations may be related to the ingestion of a diet deficient in fiber and rich in carbohydrate. By adding indigestible fiber to the diets of diverticular patients, the frequency of defecation was only marginally increased in contrast to the considerable increase in the bulk of the stool. A high intake of indigestible fiber may lead to an increase in the stool weight of 100%, but simultaneously may only increase the frequency of defecation by 10-20%. When 70 patients received a high fiber/low sugar diet, including unprocessed bran, for an average of 22 months, symptoms were relieved or abolished in over 85% of the cases. This included relief from painful disease and accompanying symptoms such as abdominal distension and flatulence. In another 40 patients, abdominal discomfort, distension and flatulence were somewhat accentuated initially, due to forcing of the narrowed colon to deal with considerably increased bulk in the fecal stream. This discomfort phase seldom lasted more than 3-6 weeks. In a study measuring transit time, Ugandan villagers eating a bulky diet passed 80% of the markers in 35.7 hr compared with 76.1 hr in a group of English schoolboys on a refined diet. In a study measuring fecal weight, diverticular patients on a low residue diet had a fecal output of less than 100 g/day while those on a high residue diet with a bran supplement had a stool weight approaching 200 g daily. Under the latter conditions the colonic wall expends less effort in segmentating and propelling the less viscous fecal residue.

8613 LONGITUDINAL FISTULA OF THE COLON IN DIVERTICULITIS. *(E.)* Loeb, P. M.; Berk, R. N.; Saltzstein, S. L. (Sch. Med., Univ. California, San Diego). *Gastroenterology* 67(4):720-724, 1974.

A longitudinal intramural fistula of the colon appeared in a patient with diverticulitis. The patient, a 68 yr old man, was admitted with pain and vomiting of 2 weeks duration. Barium enema examination showed irregularity and thickening of the interhaustral folds in the sigmoid colon with numerous diverticula. The 11-cm long paracolic fistula filled with barium and communicated with the lumen at multiple points. A fiberoptic colonoscope showed normal mucosa except for the orifices of numerous diverticula in the sigmoid colon. In this patient there were no clinical, radiographic, or pathological features of granulomatous colitis. The terminal ileum, proximal colon, and perianal area were normal. The fistula was subserosal, with no transmural inflammation or granulomatous reaction. This case demonstrated that the presence of a longitudinal fistula greater than 10 cm cannot be considered pathognomonic of granulomatous colitis.

8614 FAECAL FLOW PATTERNS IN CHOLERRHEIC ENTEROPATHY AND COLONIC DIVERTICULAR DISEASE. *(E.)* Findlay, J. M.; Mitchell, W. D., Anderson, A. J. B.; Eastwood, M. A.; Smith, A. N. (Western Gen. Hosp., Edinburgh, Scotland). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 355-364.

Fecal flow patterns for 2 gastrointestinal extremes, cholerrheic diarrhea and diverticular disease, were examined by measuring the differential rates of recovery of equal doses of 2 synchronously fed markers. In the 1st experiment, patterns of fecal flow were investigated in 4 normal, healthy subjects passing normally formed stools, 5 hospitalized patients without diarrhea or diverticular disease who passed normal stools, and 5 patients with cholerrheic enteropathy. In the 2nd experiment 6 patients with diverticular disease were compared with 6 normals. Polyethylene glycol (500 mg) and chromium sesquioxide (500 mg), suitable markers for the liquid and solid phases of gut contents, resp., were fed synchronously 3 times/day for 4-11 days. The stools were pooled into 24-hr collections, and the markers were then estimated and expressed in terms of 24-hr outputs. There was no significant difference in the rate of throughput for the liquid and solid phase markers in healthy individuals and hospitalized patients with normal bowel habit, indicating that streaming does not usually occur. In cholerrheic enteropathy, the liquid phase marker was excreted 1.5 times faster than the solid phase, while in the diverticular disease group, the liquid phase was excreted 0.75 times slower than the solid phase marker. These findings may reflect the effects of colonic hypersegmentation on the relative distribution of the liquid and solid phases of gut contents.

8615 THE BIOLOGICAL SIGNIFICANCE OF RECTAL POLYPS. A COMPREHENSIVE STUDY OF 425 CASES.

(E.) Incze, F. (Stephen Hosp. of Metrop., Budapest, Hungary). *Am. J. Proctol.* 25(5):49-56, 1974.

Statistical findings from 425 cases of rectal polyps are presented in terms of morphological and histological characteristics, occurrence and recurrence rates, and survival rates of patients undergoing either radical or local surgery. The 425 cases were divided as follows: 333 patients with typical (benign) adenomatous polyps, 44 cases of adenomatous and villous polyps with atypia (4 recurrent), 35 cases of adenomatous and villous polyps with malignant tendency (1 recurrent), and 21 cases of carcinomatous polyps (3 recurrent). Males accounted for 62% of all cases of benign and malignant polyps and invasive cancers. The average age of the benign polypoid patient was 48.2 yr, that of the malignant polypoid patient 55 yr, and that of the cancerous patient 58.6 yr. Weight loss was experienced by every 7th benign, every 3rd malignant polypoid, and every 2nd invasive cancerous patient. Malignant and invasive cancerous patients had significantly shorter histories than benign patients. The characteristic location for benign polyps was anal, for the malignant (and related benign) polyps the pelvic part of the rectum, and for invasive cancer the ampullar part of the rectum. Malignant polyps were over 15 mm in size in 46% of cases, while 75% of the benign polyps were less than 15 mm in size. Over 80% of the malignant and all of the benign polyps were removed locally. Benign polypoid patients had a 6.9% recurrence rate for benign polyps and a 2.4% recurrence rate for malignant polyps. Malignant polypoid patients undergoing local surgery had a benign polyp recurrence rate of 12.5% and a malignant recurrence rate of 3.7%; those undergoing radical operations showed recurrences of 15% and 5% for benign and malignant polyps, resp. The operative mortality for radical removal of malignant polyps was 10%, while that for malignant patients undergoing local surgery was 4%. The overall mortality rate for local removal was 3.3% (death due to rectal cancer).

8616 ADENOMATOUS POLYPS OF LARGE INTESTINE IN AUTOPSY AND SURGICAL MATERIAL.

(E.) Sato, E. (Tohoko Univ. Sch. Med., Japan). *Gann* 65(4):295-306, 1974.

A survey of adenomatous polyps in autopsy and surgical specimens was conducted to assess their premalignant potential. Examination of the large intestine in 1,000 autopsy subjects yielded 95 patients (9.5%) with 127 adenomas. This frequency was significantly higher than that of hypertrophic mucosal protrusion (3.5%), juvenile-type polyp (0.3%), Peutz-Jeghers type polyp (0.2%), and hyperplasia (metaplasia) (1.1%). Adenoma increased in frequency with advancing age, appearing in 33.3% of octogenarians. The right colon (51.2%) was the most frequent adenomatous site, followed by the distal transverse and descending colon (23.6%). The adenomas were found in the sigmoid colon or rectum in 18% of subjects. Analysis of the age distribution of 116 surgical patients with 150 adenomas revealed that satellite polyps were most numerous between 60 and 69 yr of age, whereas adenomas in noncancerous bowel were most frequently observed in the 40's. Histological atypia was related to the size and location of adenomas. In the autopsy series atypia was most prominent in the lower large bowel. The incidence of focal malignancy in adenomas was 21.4% in females and 14.1% in males. Adenomas of the surgical series, obtained mostly from the lower tract, generally showed advanced atypia. Adenomas with focal malignancy were found in 13.3% of the surgical series but rose to 32.6% in adenomas of over 10 mm in diameter.

8617 THE SIGNIFICANCE OF PAPILLARY FEATURES IN POLYPS OF THE LARGE INTESTINE.

(E.) Kurzon, R. M.; Ortega, R.; Rywlin, A. M. (Mt. Sinai Med. Ctr., Miami Beach, Fla.). *Am. J. Clin. Pathol.* 62(4):447-454, 1974.

Histological studies were performed on 662 surgically removed polypoid epithelial lesions of the large intestine. The polypoid lesions were classified as adenomas, papillomas, mixed lesions (adenomatous and papillary features), or hyperplastic polyps. Carcinoma was found in 48% of the papillomas, 18% of the mixed lesions, and 1% of the adenomas. Among the hyperplastic polyps, 3 (5%) contained a mixture of hyperplastic and carcinomatous glands. Eighty percent of the carcinomas were superficial and 20% were invasive. Metastases occurred in 1/3 of the invasive carcinomas and in none of the superficial carcinomas. The presence of a papillary growth pattern in colonic polyps appears to be associated with an increased malignant potential.

8618 HISTOPATHOLOGICAL ANALYSIS OF BENIGN POLYPS IN PATIENTS WITH CARCINOMA OF THE COLON AND RECTUM.

(E.) Ekelund, G.; Lindstrom, C. (Malmo Gen. Hosp., Sweden). *Gut* 15(8):654-663, 1974.

All benign polyps in a 10-yr series of 960 patients with colorectal carcinoma from a defined population were analyzed to investigate the relationship between benign epithelial neoplasms and adenocarcinoma of the colon and rectum. All cases where histological specimens of the polyps were available were reclassified according to morphological type and grade of differentiation. Polyps were found in 215 patients (132 men and 83 women) with a median age of 65-69 yr. Of 381 polyps available for histological review, 308 were benign epithelial neoplasms, 46 metaplastic, and 27 miscellaneous types. Almost 1/4 of all benign epithelial neoplasms were adenovillous lesions. In men, 54% of the polyps were observed in the sigmoid colon and rectum; a 38% occurrence of polyps in these regions was seen in women. Benign epithelial neoplasms tended to be situated in the vicinity of coexisting carcinoma. The differentiation of benign epithelial neoplasms tended to be poorer with decreasing distance from the anus and with increasing size of the lesion. Metaplastic polyps (46) were found in 26 patients (15 men and 11 women); 23 of the polyps were seen in men and 23 in women. Thirty were found in cases with solitary carcinoma and 16 in cases with multiple carcinomas. None of the metaplastic polyps were found in patients under 50 yr of age. Metaplastic polyps found in the sigmoid colon or rectum accounted for 84% of those observed. Of 27 miscellaneous polyps observed, 20 were lesions with microscopically normal mucosa, 3 were inflammatory, and 4 were mesenchymal. The findings tend to support a relationship between benign epithelial neoplasms and colorectal carcinoma.

8619 THE EPIDEMOLOGIC PATHOLOGY OF CARCINOMAS OF THE LARGE BOWEL. *(E.)* Bert, J. W.; Godwin, II, J. D. (Natl. Cancer Inst., Bethesda, Md.). *J. Surg. Oncol.* 6(5):381-400, 1974.

From the Ends Results Group Registery, 60,1930 cases of histologically confirmed cancers of the large intestine were analyzed by histologic type. Adenocarcinomas were the standard against which cancers with other diagnoses were compared. Colloid carcinoma (4.6% of all cancers) made up 13% of cancers of patients under 30 yr, particularly men, and was twice as frequent in blacks as in whites. Colloid cancers of the right colon, including the appendix, had relatively high survival rates while those of the left colon, rectosigmoid, and rectum had survival rates below those for adenocarcinomas at the same sites. Papillary carcinomas had a better than average prognosis (56% 5-yr survival while polypoid carcinomas had the best prognosis of any carcinoma (77% 5-yr survival). Adenosquamous and squamous cell carcinomas in the rectum resembled anal cancers in the high frequency of women, the high frequency of blacks, and the greater proportions of patients under 40 yr. The one similarity between rectal epidermoid and colonic adenosquamous cancers was their equally poor prognosis: 34 and 25% 5-yr survival compared with 52% for anal epidermoid cancers. Malignant carcinoids in the appendix resembled benign carcinoids of that organ; 5-yr survival rates for rectal and colonic carcinoids were 67% and 48%, resp. Rectal carcinoids were usually common in blacks (33% of all patients with this tumor). Grade appeared to be an independent prognostic parameter, although low grade of malignancy implied an early stage; the lower the grade the more localized the cancer and the fewer distant metastases. Each of the special types of cancer of the intestine studied had sufficient differences in presentation and behavior to justify being distinguished from adenocarcinoma.

8620 CEA LEVELS AND PROGNOSIS IN COLON CARCINOMA. *(E.)* Bivins, B. A.; Boyd, C. R.; Meeker, Jr., W. R.; Griffen, Jr., W. O. (Med. Ctr., Univ. Kentucky, Lexington). *J. Surg. Oncol.* 6(5): 413-421, 1974.

The rate of fall of carcinoembryonic antigen (CEA) in the postoperative period was studied in 16 patients (14 men and 2 women, average age 57 yr) with colorectal carcinoma admitted for diagnosis and treatment. Clinical follow-up was conducted for an average of 9 months. Of the 16 patients, 14 (88%) had elevated preoperative levels of CEA. The mean value of elevation was 9.8 ng/ml. Dukes Class C lesions were present in 15 patients; 11 patients had potentially curative resection. In 6 patients, elevated preoperative CEA titers returned to normal between 1 week and 3 months postoperatively. One of these 6 patients returned after 20 months for a perineal recurrence of the adenocarcinoma. At the time of his readmission the CEA titer was normal, 2.2 ng/ml. In 3 patients, elevated preoperative CEA levels did not return to normal up to 6 months postoperatively, but the patients have remained clinically free of disease. Two patients with normal preoperative CEA levels showed rises in CEA levels quite promptly in the postoperative period. Both experienced a return of the CEA titer to normal over 2 to 3 months. Of the 5 patients who underwent only palliative procedures, all continued to have high CEA titers. The slow decline of CEA in this study compared to other investigations may result from suppression or destruction of the residual tumor by the host immune mechanism. All patients in this study had advanced lesions and residual tumor may indeed be a possibility. It is suggested that failure to detect an early decline in CEA levels to normal may not imply a poor prognosis.

8621 RELATIONSHIP OF CARCINOEMBRYONIC ANTIGEN TO BLOOD SUBSTANCES A AND i: EVIDENCE THAT THE ANTIGENIC SITES ARE ON DIFFERENT MOLECULES. *(E.)* Cooper, A. G.; Brown, M. C.; Kirch, M. E.; Rule, A. H. (Tufts Univ. Sch. Med., Boston, Mass.). *J. Immunol.* 113(4):1246-1251, 1974.

Extracts of 7 primary adenocarcinomas of the colon and 6 colonic carcinomas metastatic in the liver were obtained from human specimens during surgery and autopsy and assayed for the presence of blood group substance A and i activities with an automated quantitative hemagglutination-inhibition system. Carcinoembryonic antigen (CEA) activity was simultaneously assayed by the zirconyl phosphate gel radioimmunoassay. Isoelectric focusing of a perchloric acid tumor extract containing all 3 antigen activities indicated a similar dissociation constant value for the 3 antigens. However, A- or i-specific affinity gel adsorption experiments showed that only the corresponding blood group antigen activity was removed from tumor extracts. CEA activity remained essentially the same after adsorption by these gels. Significant blood group activity could not be demonstrated in preparations of highly purified CEA or in CEA from which *N*-acetylneuraminic acid and fucose had been removed. Conversely, CEA activity was absent from preparations of purified blood group antigens and could not be unmasked by removal of the immunodominant β-galactose of the i antigen with β-galactosidase. The antigenic sites for CEA and blood group A and i antigens appear to be located on different molecules in colonic carcinoma extracts. There was no correlation between CEA levels and blood group antigen levels in the extracts. The highest A antigen levels were present in primary colonic adenocarconomas, whereas the highest i antigen levels were found in metastatic colonic carconomas. This suggests that in those cells which metastasize, there is a selective diminution of those glycosyl transferases which are responsible for the addition of the terminal sugars conferring ABH blood group specificity onto a precursor i antigen.

8622 BLOOD GROUP SUBSTANCES (BG) AS CARCINOFETAL ANTIGENS IN CARCINOMAS OF THE DISTAL COLON. *(E.)* Denk, H.; Tappeiner, G.; Holzner, J. H. (Univ. Pathol. Anat. Inst., Vienna, Austria). *Eur. J. Cancer* 10(8):487-490, 1974.

The presence of blood group substances (BG) was studied using the mixed cell agglutination reaction in a group of 33 colonic carcinomas, including 2 carcinomas of the cecum (22 patients with BG-A and 11 patients with BG-B) and 8 metastases to the liver from colonic carcinomas. BG-A was positive in 15 of the 22 colonic carcinomas (68.2%) and BG-B was positive in 5 of 11 (45.5%). In most of the tumors, the entire tumor area was BG-positive. Even superficially localized carcinomas bordering the lumen of the gut were BG-positive while the surrounding non-neoplastic mucosa did not express BG-like activity. Normal non-neoplastic mucosa of the descending and the pelvic colon and rectum were invariably BG-negative, contrary to the mucosa of the cecum which contained BG in the goblet cells. Adenomatous polyps of the colon without histologic evidence of malignancy (5 cases) did not contain BG. Of the 8 liver metastases, 6 expressed BG activity in uniform distribution, 1 in patchy distribution and 1 was negative. Necrotic areas of positive carcinomas were BG-positive as well. Liver and Kupffer cells were BG-negative. Erythrocytes and endothelial cells showed positive mixed-cell agglutination reaction in accordance with the erythrocyte blood group of the patient. BG noncompatible with the blood group of the patient was not observed. The positive mixed-cell agglutination reaction was abolished by absorption of the BG antisera with their respective isologous erythrocytes. Since the mucosal cells of the whole colon contain BG in the fetal period which, however, rapidly disappear after birth, reappearance of BG in the tumor may represent derepression of embryonic gene functions during carcinogenesis. Therefore, normal antigens like BG act as "carcinofetal antigens" in certain carcinomas of the distal large bowel. The localization of BG in primary and secondary colonic carcinomas differs from CEA. Thus the immunologic cross reactivity between BG and CEA noted with purified substances is not demonstrable in tissue sections with the morphologic method used.

8623 IMMUNE REACTIVITY OF LYMPHOID TISSUES ADJACENT TO CARCINOMA OF THE ASCENDING COLON. *(E.)* Mavligit, G. M.; Jubert, A. V.; Gutterman, J. U.; McBride, C. M.; Hersh, E. M. (M. D. Anderson Hosp. Tumor Inst., Houston, Tex.). *Surg. Gynecol. Obstet.* 139(3):409-412, 1974.

The immunologic reactivity of lymphoid tissues neighboring carcinoma of the right colon was studied in 9 patients (aged 45-74 yr) with a lymphocyte blastogenic response method. All of the patients underwent right hemicolectomy for primary adenocarcinoma of the cecum or ascending colon. Mesenteric lymph nodes were obtained from 4 patients, appendix lymphocytes from 3 patients, and lymphocytes from the terminal part of the ileum and peripheral blood from all 9 patients. Positive blastogenic responses to phytohemagglutinin were observed in 22 of 25 lymphocyte preparations tested. The responses were of equal incidence and magnitude, except among lymphocytes derived from the terminal part of the ileum where both the incidence and magnitude of response were lower. Blastogenic responses in mixed leukocyte reaction varied. Peripheral blood lymphocytes and lymph node lymphocytes were highly reactive both in terms of positive incidence and magnitude, while appendix lymphocytes and lymphocytes from the terminal part of the ileum were less reactive or unreactive for 2 of 3 appendixes and 7 of 9 ileal preparations. Blastogenic responses to pokeweed mitogen were also equally distributed among different preparations, except for the lowered responses of lymphocytes from the terminal part of the ileum. Responses to streptolysin O were of a generally lower magnitude and less frequently positive than the responses to the mitogens. The responses were equally distributed, again except for the lower responses of lymphocytes from the terminal part of the ileum. Tumor-induced blastogenesis among autologous lymphocytes was detected in 3 of 5 lymphocyte preparations from the terminal part of the ileum. The responses of peripheral blood lymphocytes to autochthonous tumor were of the same magnitude and incidence, while appendix lymphocytes and lymph node lymphocytes remained totally unreactive to tumor cells. These different responses probably reflect different bone marrow-derived and thymus-dependent subpopulations among the tissues and in some instances, an immunosuppressive effect exerted by the tumor.

8624 DIFFUSE COLONIC MUCOSAL HYPERPLASIA. MORPHOLOGY AND SIGNIFICANCE. *(E.)* Prior, J. T.; Dunn, E. (Upstate Med. Ctr., Syracuse, N.Y.). *Arch. Surg.* 109(4):575-577, 1974.

A 43-yr-old man presented with adenocarcinoma of the rectum in which the surrounding mucosa was the site of several hyperplastic foci. This case suggests that mucosal hyperplasia is either not generally recognized or possibly ignored by both clinicians and pathologists. The hyperplastic foci showed a uniform structure; the contours were bosselated and mushroom-shaped with a generally smooth, free surface. The mouths of crypts of Lieberkuhn were wider than normal, and the individual cells tended to take a more intense hematoxylin reaction than the adjacent uninvolved mucosal epithelium. An overall increase in the number of columnar epithelial cells was noted at the expense of decreased goblet cell elements. The component cells were larger than normal, crowded together, and showed a tendency to stratification. Individual cell polarity was maintained. Mitotic activity was not increased. The stroma of the hyperplastic foci were compressed by the enlarged epithelial cells, but contained the usual number of round cells. Discrete lymphoid nodules with prominent germinal centers were located in the lamina propria and were associated with the majority of the lesions. Occasionally the hyperplastic foci were unassociated with lymphoid tissue and, conversely, several submucosal nodules were noted that had no relation to epithelial hyperplasia. Rarely, true polyps were noted of the adenomatous variety, although an occasional lesion contained isolated fronds consistent with the mixed or composite variety. In 1 of these tumors a diagnosis of carcinoma *in situ* could be made. The polyps were also invariably associated with mucosal lymphoid nodules. This case, showing both hyperplasia and polyps in the presence of a carcinoma, gave the opportunity to trace the sequential evolution of the benign lesions to carcinoma. This combination may be important in view of current immunological concepts linking host defenses to lymphocytic activity. While the hyperplasia-to-polyp sequence seems clear, multiple sections from the carcinoma and its contiguous areas failed to show evidence of a benign lesion.

8625 THE ASSOCIATION OF NEOPLASMS OF THE COLON AND RECTUM. WITH PRIMARY MALIGNANCIES OF OTHER SITES. *(E.)*

Schoenberg, B. S.; Christine, B. W. (Mayo Grad. Sch. Med., Rochester, Minn.). *Am. J. Proctol.* 25(4):44-60, 1974.

The association of colon and rectum neoplasms with primary neoplasms of other organ systems was analyzed by a retrospective analysis of the hospital records of 12,729 colon cancer patients, 8,083 rectal cancer patients, and 100,648 patients with malignancies at other sites. Overall, patients with colon cancer had a 1.44-fold higher risk of developing a secondary primary than the age and sex-matched controls. The excess risk of developing a 2nd nonsimultaneously diagnosed malignancy was greatest for colon, rectum, uterine corpus and ovary, showing a 2-way association. Rectal cancer patients, however, were not at an overall high risk for developing a 2nd independent malignancy except for a few specific instances: colon, ovary, and prostate. A 2-way association was present only between rectal cancer and cancer of the rectum and colon. Possible sources of bias resulting in skewed data include possible misdiagnosis of metastatic disease as a 2nd primary and the fact that the population with 1 primary tends to be followed more closely than the general population, thus resulting in a higher incidence of discovery of a 2nd primary.

8626 INTRA-ARTERIAL COMBINED CANCER CHEMOTHERAPY IN TECHNICALLY INOPERABLE CARCINOMA OF THE ANUS AND RECTUM. *(E.)*

Fischerman, K.; Briand, P.; Olsen, J.; Nielsen, O. V. (Rigshosp., Copenhagen, Denmark). *Acta Chir. Scand.* 140(5): 416-421, 1974.

Intra-arterial combined cancer chemotherapy with 5-fluorouracil and vincristine was administered to 5 patients (3 men and 2 women, 48-71 yr of age) with technically inoperable rectal and anal carcinomas. The patients were catheterized through the superior hemorrhoid artery with a Watkin's catheter and continually infused with 5-fluorouracil (15 mg/kg/day) and vincristine (1 mg/week) for 6-21 days, depending on catheter function. In 2 patients the 5-fluorouracil treatment was continued systemically. Rectoscopy was performed each week to estimate changes in tumor size, obtain biopsies for histologic and cytologic evaluation, and assay LDH and phosphofructokinase activity in 3 of the patients. Reductions in tumor size were observed in all patients during and after treatment. Cytologic changes after 3 weeks of treatment suggested less tumor vitality. Both LDH and phosphofructokinase activity declined during the late stage of treatment, though in 2 of the 3 patients assayed a rise in the activities of both enzymes was noted about 10 days after termination of the infusion. The toxic effect on bone marrow was modest: only 1 patient showed a drop in leukocyte count to below normal. Normal mucosa was not affected by the cytostatic agents used; *in vivo* experiments with 7 pigs and 3 dogs subjected to extracorporeal gastric perfusions containing the cytostatic agent daunomycin confirmed the absence of effect on normal mucosa. The tumors in 2 of the patients were converted to operable ones, and the surgical removal of the rectum in each case was performed. Two patients died just after the intra-arterial treatment, 1 patient from pneumonia and the other from pulmonary embolism. Another patient lived 14 months after treatment and died from carcinoma. One of the surgical patients is still alive and well 30 months after rectum removal. Absence of a toxic effect on bone marrow or of damage to normal tissue, and reduction in tumor size, recommend intra-arterial treatment as increasing chances for survival in cases of inoperable rectal or anal carcinoma.

8627 THE PROPHYLACTIC USE OF ANTIBIOTICS IN SURGERY FOR COLONIC CARCINOMA. *(E.)*

Farmer, R. G. (Cleveland Clin. Fdn., Ohio). *Dis. Colon Rectum* 17(5):633-637, 1974.

A prospective clinical study was made of 39 patients undergoing surgery for newly diagnosed colonic carcinoma in the 1st half of 1973. All received mechanical cleansing consisting of a 48-hr preparation with castor oil, p.o., in the morning, followed by enema 4 times/day on each of 2 preoperative days. About 19 hr before the scheduled surgical procedure, 3 doses of neomycin and erythromycin base, 1 g each/dose, were given p.o. Enemas were given the morning of surgery and in the operating room just prior to surgery. Of the 39 patients, 28 (20 men and 8 women, average age 68 yr) received the total preoperative treatment while the other 11 received either single antibiotics or none. The locations of the carcinoma in these 28 patients were: sigmoid colon, 13; rectum, 2; descending colon, 2; transverse colon, 3; ascending colon, 4; and cecum, 4. Of these lesions 23 were resectable using the no-touch isolation technique. Of the 11 patients receiving other types of preoperative management (6 men and 5 women, average age 61 yr) 8 lesions were in the sigmoid, 2 in the cecum and 1 in the transverse colon of which 7 were resectable. No postoperative infections occurred in the 28 patients receiving preoperative antibiotic coverage plus mechanical cleansing. All had uneventful postoperative courses and short hospital stays. Of the 11 treated by other means, 2 had significant postoperative infections. This outcome confirms the efficacy of the combination of neomycin and erythromycin base in association with mechanical cleansing for preoperative preparation. The ease of administration, the short-term duration of the preparation, the lack of resistant organisms developing in this short period, and the realization that prophylactic antibiotics are only complementary to mechanical cleansing, adequate surgical technique, and postoperative care have led to a decrease in morbidity and mortality from postoperative sepsis.

8628 COLONOSCOPY IN THE MANAGEMENT OF DISEASES OF THE COLON AND RECTUM. *(E.)* Sugarbaker, P. H.; Vineyard, G. C.; Lewicki, A. M.; Pinkus, G. S.; Warhol, M. J.; Moore, F. D. (Harvard Med. Sch., Boston, Mass.). *Surg. Gynecol. Obstet.* 139(3):341-349, 1974.

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8647 AMINO ACID COMPOSITION OF SERUM IN PATIENTS WITH CHRONIC COLITIS. *(Rus.)* Smagin, V. G.; Asafov, G. B.; Ekisenina, N. I.; Ivanova, L. M.; Lumelskii, V. Ia. (4th Dept. Min. Publ. Health, Moscow, USSR). *Ter. Arkh.* 46(4):141-147, 1974.

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8654 CLINICAL FEATURES OF ISCHEMIC BOWEL DISEASE. *(E.)* Haddad, H. (no affil.). *Can. J. Surg.* 17(6):435-437, 1974.

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8671 UNUSUAL METASTATIC SITES OF COLONIC AND RECTAL CARCINOMA: REPORT OF FOUR CASES. *(E.)* Lee, S. M.; Whiteley, Jr., H. W. (Mem. Sloan Kettering Cancer Ctr., New York, N.Y.). *Dis. Colon Rectum* 17(4):560-561, 1974.

8672 LYMPHOSARCOMA OF THE BOWEL MASQUERADING AS ULCERATIVE COLITIS: REPORT OF A CASE. *(E.)* Myerson, P.; Myerson, D.; Miller, D.; De Luca, Jr., V. A.; Lawson, J. P. (Griffin Hosp., Derby, Conn.). *Dis. Colon Rectum* 17(5):710-715, 1974.

8673 GARDNER'S SYNDROME: REPORT OF A CASE INITIALLY PRESENTING AS DIFFUSE METASTATIC ADENOCARCINOMA. *(E.)* Julien, P. J.; Melton, C. R.; Minagi, H.; Margulis, A. R.; Harris, J. B. (Univ. California Sch. Med., San Francisco). *Am. J. Gastroenterol.* 62(2):156-164, 1974.

8674 BONY METASTASIS FROM ADENOCARCINOMA OF THE COLON. *(E.)* Baker, L. H.; Vaitkevicius, V. K.; Figiel, S. J. (Wayne State Univ. Sch. Med., Detroit, Mich.). *Am. J. Gastroenterol.* 62(2):139-144, 1974.

8675 POTENTIAL INHIBITORS OF COLON CARCINOGENESIS. *(E.)* Wattenberg, L. W. (Univ. Minnesota Sch. Med., Minneapolis). *Am. J. Dig. Dis.* 19(10):947-953, 1974.

8676 EXPERIMENTAL OBSERVATIONS ON INTESTINAL HEALING IN MALIGNANT DISEASE. *(E.)* Stewart, R. J.; MacNaughton, J. I.; Thorley, R. S. (Westminster Hosp., London, England). *Ann. R. Coll. Surg. Engl.* 54(6):269, 1974.

8677 THE CHEMOTHERAPY OF LARGE-BOWEL CANCER: PRESENT STATUS AND FUTURE PROSPECTS. *(E.)* Horton, J.; Hacker, B.; Cunningham, T. J.; Sponzo, R. W. (Albany Med. Coll., N.Y.). *Am. J. Dig. Dis.* 19(11):1040-1046, 1974.

8678 THE ROLE OF RADIATION THERAPY IN THE CONTROL OF COLORECTAL CANCER. *(E.)* Raventos, A. (Sch. Med., Univ. California, Davis). *Am. J. Dig. Dis.* 19(11):1036-1039, 1974.

8679 PREOPERATIVE ROENTGEN THERAPY FOR CANCER OF THE RECTUM AND RECTOSIGMOID. *(E.)* Stearns, Jr., M. W.; Deddish, M. R.; Quan, S. H. Q.; Leaming, R. H. (Mem. Sloan-Kettering Cancer Ctr., New York, N.Y.). *Surg. Gynecol. Obstet.* 138(4):584-586, 1974.

8680 IMMUNOBIOLOGY OF COLON CARCINOMAS. *(E.)* Sjogren, H. O. (Wallenberg Lab., Univ. Lund, Sweden). *Am. J. Dig. Dis.* 19(11):1033-1035, 1974.

8681 IMMUNOTHERAPY: ITS POSSIBLE APPLICATION IN THE MANAGEMENT OF LARGE-BOWEL CANCER. *(E.)* Mavligit, G. M.; Gutterman, J. U.; Burgess, M. A.; Speer, J. F.; Reed, R. C.; Martin, R. C.; McBride, C. M.; Copeland, E. M.; Gehan, E. A.; Hersh, E. M. (M.D. Anderson Hosp., Houston, Tex.). *Am. J. Dig. Dis.* 19(11):1047-1053, 1974.

8682 FACTORS INFLUENCING OPERABILITY AND INOPERABILITY OF CARCINOMA OF THE COLON AND THE RECTUM. *(E.)* Drobni, S. (no affil.). *Am. J. Proctol.* 25(5):79-86, 1974.

8683 ABDOMINOPERINEAL RESECTION FOR CANCER OF THE RECTUM. *(E.)* Stearns, Jr., M. W. (Mem. Sloan-Kettering Cancer Ctr., New York, N.Y.). *Dis. Colon Rectum* 17(5):612-616, 1974.

8684 AN EVALUATION OF PALLIATIVE ABDOMINOPERINEAL RESECTION FOR CARCINOMA OF THE RECTUM. *(E.)* Bordos, D. C.; Baker, R. R.; Cameron, J. L. (Johns Hopkins Med. Inst., Baltimore, Md.). *Surg. Gynecol. Obstet.* 139(5):731-733, 1974.

8685 RESECTABILITY, OPERATIVE MORTALITY, AND SURVIVAL OF PATIENTS IN OLD AGE WITH CARCINOMA OF THE COLON AND RECTUM. *(E.)* Kragelund, E.; Balslev, I.; Bardram, L.; Jensen, H. E.; Nielsen, J. (Kommunehosp., Copenhagen, Denmark). *Dis. Colon Rectum* 17(5):617-621, 1974.

8686 RADIOLOGIC STUDY OF THE ANASTOMOSIS AFTER RIGHT COLECTOMY. *(E.)* Bickham, Jr., C. E. (Doctor's Hosp., Washington, D.C.). *South. Med. J.* 67(11):1301-1305, 1974.

See also, 8246, 8429, 8451, 8545, 8550, 8561, 8569, 8694, 8738, 8817, 8850, 8851, 8863, 8874, 8876, 8882, 8884, 8905.

LARGE INTESTINE

Ulcerative Colitis

8687 HYPOSPLENISM IN ULCERATIVE COLITIS. *(E.)* Ryan, F. P.; Smart, R. C.; Preston, F. E.; Holdsworth, C. D. (Roy. Infirm., Sheffield, England). *Lancet* (7876):318-320, 1974.

Blood films of 3 male patients with ulcerative colitis (ages 28, 65, and 52 yr at time of colitis development) were examined after a finding of Howell-Jolly bodies suggestive of hyposplenism in the blood film of 1 of the patients. Studies of the clearance of ^{51}Cr-labeled heat-damaged red blood cells revealed half clearance time values of 130 ± 6, > 171, and 92.5 ± 6 min, resp., for the colitis patients as compared to a normal range of 9.0-17.5 min (10 controls). Each patient thus displayed severe splenic hypofunction; no uptake was measurable over the spleen in any patient, confirming that the spleen was not clearing the damaged red blood cells from the circulation. Hyposplenism probably developed over the course of the colitis since retrospective examination of the patients' records revealed normal blood films when they first presented with colitis.

8688 HL-A 27 AND ARTHROPATHIES ASSOCIATED WITH ULCERATIVE COLITIS AND PSORIASIS. *(E.)* Brewerton, D. A.; Caffrey, M.; Nicholls, A.; Walters, D.; James, D. C. O. (Westminster Hosp., London, England). *Lancet* (7864):956-957, 1974.

The histocompatibility antigen HL-A 27 was identified with a 2-stage lymphocytotoxicity micromethod in only 22 of 300 controls as compared to 13 of 18 patients with ankylosing spondylitis and ulcerative colitis. The antigen was also identified in 10 of 41 patients with psoriasis and peripheral arthropathy, 4 of 9 patients with sacro-iliitis, and 9 of 10 patients with sacro-iliitis and spondylitis. Patients with ulcerative colitis and no arthropathy did not differ significantly from controls with respect to presence of the antigen. The histocompatibility antigen findings suggest that genetic factors are more important than previously thought in the complex overlapping relationships between inflammatory bowel disease, psoriasis, ankylosing spondylitis, peripheral arthropathy, Reiter's disease, and acute anterior uveitis. Approximately 6% of patients with ulcerative colitis have clinical ankylosing spondylitis, which is 30 times more frequent than in the rest of the population.

8689 CLINICAL STUDY OF ULCERATIVE COLITIS. *(E.)* Nath, K.; Saxena, S.; Samuel, K. C. (Med. Coll., Kanpur, India). *Indian Pract.* 27(2):79-85, 1974.

8690 CLINICAL FEATURES, PATHOPHYSIOLOGY, COMPLICATIONS AND ENDOSCOPIC FINDINGS IN ULCERATIVE COLITIS. *(E.)* Devroede, G. J. (Univ. Hosp. Ctr., Sherbrooke, Canada). *Can. J. Surg.* 17(6):415-418, 1974.

8691 RADIOLOGY IN ULCERATIVE COLITIS. *(E.)* Supelano-Guevara, H. (no. affil.). *Can. J. Surg.* 17(6):420-421, 1974.

8692 HISTOLOGICAL APPRAISAL OF ULCERATIVE COLITIS IN FIBREOPTIC COLONOSCOPE BIOPSY SPECIMENS. *(E.)* Lee, S. K.; Fung, W. P. (Outram Road Gen. Hosp., Singapore). *Aust. NZ J. Med.* 4(3):306, 1974.

8693 HISTOPATHOLOGY OF CHRONIC ULCERATIVE COLITIS. *(E.)* Sanchez-Casis, G. (no affil.). *Can. J. Surg.* 17(6):418-419, 1974.

8694 THE INVESTIGATION OF COLITIS IN INFANCY. *(E.)* Berger, L. A.; Wilkinson, D. (Hosp. Sick Children, London, England). *Pediatr. Radiol.* 2(3):145-154, 1974.

8695 ETIOLOGY AND EPIDEMIOLOGY OF ULCERATIVE COLITIS. *(E.)* Spencer, R. J. (no affil.). *Can. J. Surg.* 17(6):414-415, 1974.

8696 THE SIGNIFICANCE OF AUTOIMMUNE REACTIONS IN THE PATHOGENESIS OF NONSPECIFIC ULCERATIVE COLITIS. *(Rus.)* Blinger, A. F.; Veksler, Kh. P.; Timoshenko, Zh. P.; Tuia, I. A.; Akinfova, T. A.; (Riga Med. Inst., USSR). *Ter. Arkh.* 46(4):125-130, 1974.

8697 MEDICAL MANAGEMENT OF ULCERATIVE COLITIS. *(E.)* Lennard-Jones, J. E. (no affil.). *Can. J. Surg.* 17(6):422-427, 1974.

8698 COLECTOMY WITH ILEOPROCTOSTOMY FOR ULCERATIVE COLITIS: REPORT OF FIVE CASES. *(E.)* Smith, D. L; Goldman, H. S.; Foote, R. F. (Foote-Smith Proctol. Med. Group, Inc., Encino, Calif.). *Dis. Colon Rectum* 17(5):681-684, 1974.

8699 PROGNOSIS OF ULCERATIVE COLITIS AFTER MEDICAL TREATMENT. *(E.)* McManus, J. P. (no affil.). *Can. J. Surg.* 17(6):427-429, 1974.

8700 TOXIC MEGACOLON IN ULCERATIVE COLITIS. *(E.)* Kristensen, M.; Koudahl, G. (Rigshosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(27):44, 1974.

8701 "ULCERATIVE APPENDICITIS" OCCURRING AS A SKIP LESION IN CHRONIC ULCERATIVE COLITIS. REPORT OF A CASE. *(E.)* Cohen, T.; Pfeffer, R. B.; Valensi, Q. (Univ. Hosp., New York Univ., Forest Hills, N.Y.). *Am. J. Gastroenterol.* 62(2):151-155, 1974.

8702 ULCERATIVE COLITIS, SYSTEMIC SCLEROSIS AND NECROBIOSIS. *(E.)* Wallace, H. J. (St. Thomas' Hosp., London, England). *Br. J. Dermatol.* 91(Suppl. 10):45-46, 1974.

8703 CANCER RISK IN ULCERATIVE COLITIS: ITS INDEPENDENCE OF LUMINAL FACTORS. *(E.)* Beauregard, G.; Devroede, G. J. (Gastrointest. Res. Unit, Univ. Sherbrooke, Canada). *Can. J. Surg.* 17(5):313-315, 1974.

See also, 8644, 8672, 8848, 8912, 8913, 8914.

PANCREAS

8704 ANGIOGRAPHY IN PANCREATIC TRAUMA. *(E.)* Haertel, M.; Fuchs, W. A. (Univ. Hosp., Bern, Switzerland). *Br. J. Radiol.* 47(562):641-645, 1974.

The angiographic pattern of pancreatic trauma is described in reference to angiographic investigation of 125 patients with blunt abdominal trauma which revealed 4 cases with traumatic pancreatic lesions (3 females and 1 male, aged 4 to 52 yr). Of these 4, 2 had lacerations of more than 1 abdominal organ. Clinical features of traumatic lesions of the pancreas are not specific and are easily confused with other lesions. Elevation of the pancreatic enzymes, amylase and lipase, in the blood serum or peritoneal fluid strongly, but not specifically, indicate pancreatic lesions. Radiodiagnostic signs are unspecific and unreliable. Hemoperitoneum and/or local paralysis of the small intestine may be present. Only hematomas situated in the lesser peritoneal sac lead to rather characteristic ventral displacement of the stomach. Angiographic features include occlusion of pancreatic arteries and local impairment of the arterial circulation. Collateral circulation may develop. Additional displacement of adjacent arteries indicates hematoma. Displacement of the duodenum, stomach, proximal jejunum, and its supplying arteries, may occur. Arteriovenous shunting and extravasation of contrast material was not noted in these patients. The venous phase of the celiac and mesenteric angiogram are important diagnostic tools. The formation of a hematoma and post-traumatic edematous swelling of the pancreas compresses and obstructs the splenic vein situated on the dorsocranial aspect of the pancreas. Prestenotic dilatation of the splenic and portal vein and a collateral portal circulation may indicate portal venous obstruction. Pancreatic pseudocysts may develop within weeks as post-traumatic sequelae and may be noted angiographically by marked displacement of the otherwise normal arteries. Subphrenic abscess formation, also a complication of pancreatic trauma, may be diagnosed by angiography on the basis of arterial vascular displacement. Post-traumatic pancreatitis is indistinguishable from inflammatory pancreatic disease of other origin. Smooth circumscribed arterial stenosis, medial displacement of the gastroduodenal and pancreaticoduodenal arteries due to organ scarring, and postthrombotic changes of the splenic vein, are suggestive angiographic signs.

8705 ARGININE ESTERASE IN CYSTIC FIBROSIS OF THE PANCREAS. *(E.)* Rao, G. J. S.; Nadler, H. L. (Children's Mem. Hosp., Chicago, Ill.). *Pediatr. Res.* 8(6):684-686, 1974.

Arginine esterase activity in chloroform-ellagic acid-treated plasma from 11 patients with cystic fibrosis of the pancreas and 12 age-matched controls was resolved into its component fractions by ion-exchange chromatography on DEAE-Sephadex and electrofocusing on polyacrylamide gels. The activity was resolved into a fraction inhibited by soybean trypsin inhibitor and into a fraction resistant to soybean trypsin inhibitor. In plasma from cystic fibrosis patients, the fraction of activity inhibited by soybean trypsin inhibitor was approximately 30% of the corresponding fraction in control plasma. In contrast, the fraction of activity resistant to inhibition did not show any significant quantitative differences between control and patient plasma samples. Electrofocusing on 5% polyacrylamide gels at pH 5.0-8.0 and subsequent staining for arginine esterase activity showed qualitative changes between plasma samples from controls and cystic fibrosis patients. Six bands of arginine esterase activity were detected in control plasma samples. The most intense of the 6 bands were 3 bands (C, D, and E) clustered at the center of the gel. Plasma samples from patients contained only 5 bands. In 8 samples, band D was missing; in 2, band E; and in 1, band C. The data are consistent with and extend previous reports of differences in arginine esterase activity in plasma samples from patients with and without cystic fibrosis. The absence of a single band of arginine esterase activity is consistent with the absence of a specific arginine esterase isoenzyme in patients with cystic fibrosis.

8706 LIPASE-SECRETING ACINAR CELL CARCINOMA OF THE PANCREAS WITH POLYARTHROPATHY. A LIGHT AND ELECTRON MICROSCOPIC, HISTOCHEMICAL, AND BIOCHEMICAL STUDY. *(E.)* Burns, W. A.; Matthews, M. J.; Hamosh, M.; Weide, G. V.; Blum, R.; Johnson, F. B. (VA Hosp., Washington, D.C.). *Cancer* 33(4):1002-1009, 1974.

A functional acinar cell carcinoma of the pancreas is reported in a 52-yr-old chronic alcoholic whose most persistent complaint was of polyarthropathy, especially of the lower extremities. A malignant tumor of acinar cell origin metastatic to the liver was diagnosed pre-mortem by electron microscopy and confirmed at autopsy. The tumor contained abundant zymogen granules, and by histochemical and biochemical examination was seen to contain abundant lipase activity. It was proposed that electron microscopy should be used routinely in the diagnosis of exocrine as well as endocrine tumors of the pancreas, regardless of whether the specimen is obtained at surgery or autopsy.

8707 ADJUVANT TREATMENT OF BLUNT PANCREATIC TRAUMA. *(E.)* Adwers, J. R.; Davis, W. C. (Univ. Nebraska, Coll. Med., Omaha). *Surg. Gynecol. Obstet.* 139(4):514-518, 1974.

8708 SUDDEN ONSET OF STEATORRHEA DUE TO SURGICAL OCCLUSION OF THE MAIN PANCREATIC DUCT. REPORT OF A CASE. *(E.)* Malagelada, J. R.; McGill, D. B. (Mayo Clin., Rochester, Minn.). *Gastroenterology* 67(4):717-719, 1974.

8709 AN EXPERIMENTAL METHOD OF SEGMENTAL PANCREATIC TRANSPLANTATION. *(E.)* German, R. H.; Barrett, B.; State, D. (Harbor Gen. Hosp., Torrance, Calif.). *Surg. Gynecol. Obstet.* 139(5):744-748, 1974.

8710 THE PATHOLOGICAL ANATOMY OF VERNER-MORRISON SYNDROME: IMMUNOHISTOCHEMICAL, CYTOCHEMICAL, AND ELECTRON MICROSCOPE STUDIES. *(Ger.)* Brukhardt, A.; Mitschke, H. (Pathol. Inst., Univ. Heidelberg, Germany). *Virchows Arch.* [*Pathol. Anat.*] 364(2):145-163, 1974.

8711 LABORATORY AIDS IN THE DIAGNOSIS OF TUMORS OF THE PANCREAS. *(E.)* Lawrence, A. M.; Paloyan, E. (Univ. Chicago Pritzker Sch. Med., Ill.). *Ann. Clin. Lab. Sci.* 4(5):394-401, 1974.

8712 PANCREATIC CARCINOMA, PANCREATITIS, AND NEEDLE ASPIRATION BIOPSY. *(E.)* Kline, T. S.; Goldstein, F.; Neal, H. S. (Lankenau Hosp., Philadelphia, Pa.). *Arch. Surg.* 109(4):578-579, 1974.

8713 PANCREATIC CANCER. INITIAL TREATMENT AS THE DETERMINANT OF SURVIVAL. *(E.)* Douglass, Jr., H. O.; Holyoke, E. D. (Roswell Park Mem. Inst., Buffalo, N.Y.). *JAMA* 229(7):793-797, 1974.

See also, 8431, 8447, 8454, 8455, 8458, 8459, 8585.

PANCREAS

Pancreatitis

8714 PANCREATITIS AND LIPASE. A REEVALUATION WITH A FIVE-MINUTE TURBIDIMETRIC LIPASE DETERMINATION. *(E.)* Lifton, L. J.; Slickers, K. A.; Pragay, D. A.; Katz, L. A. (E. J. Meyer Mem. Hosp., Buffalo, N.Y.). *JAMA* 229(1):47-50, 1974.

Lipase activity was simultaneously determined with amylase activity in the sera of 30 patients hospitalized with acute pancreatitis. Amylase activity was assayed with an amyloclastic procedure and lipase activity with a turbidimetric procedure. On admission, 70% of the patients had increased serum amylase, 63% had increased lipase, and 83% had either increased lipase or amylase, or both. All patients had an increase in the level of at least 1 enzyme during the course of their illness. In 9 patients the lipase activity remained elevated with a normal amylase level, whereas in 6 the amylase level remained elevated after the lipase level had returned to normal. In 21 patients peak amylase and lipase values were within 2 days of each other, and in 7 cases the lipase peaked later than the amylase. Neither amylase nor lipase elevation was related to any specific clinical criterion:

nausea and vomiting, abdominal pain, and history of alcoholism were each present in more than 75%, while 40% had a history of pancreatitis. The results do not confirm the traditional thesis that lipase elevation occurs later and lasts longer than that of amylase. The measurement of amylase and lipase together will improve diagnostic accuracy in acute pancreatitis.

8715 PLASMA GASTRIN RESPONSES TO ARGININE IN CHRONIC PANCREATITIS. *(E.)* Kalk, W. J.; Vinik, A. I.; Bank, S.; Hayes, J. R.; Ardill, J.; Buchanan, K. D.; Keller, P.; Jackson, W. P. U. (Univ. Cape Town, Med. Sch., South Africa). *Diabetes* 23(4):264-267, 1974.

Serum gastrin responses to i.v. L-arginine hydrochloride (30 g in 150 ml saline infused over 30 min) were measured in 18 insulinopenic and noninsulinopenic patients with chronic pancreatitis (12 men and 6 women, aged 21-65 yr) and in 7 healthy men (aged 26-37 yr). The 2 patient groups did not differ significantly from controls with respect to mean fasting gastrin levels, total gastrin increment in response to arginine, or maximal gastrin increment. Pancreatitis did not impair gastrin responses to arginine nor was gastrin an important determinant of insulin secretion in these patients.

8716 IDIOPATHIC ACUTE PANCREATITIS IN CHILDREN. ASSOCIATION WITH A CLINICAL PICTURE RESEMBLING REYE SYNDROME. *(E.)* Morens, D. M.; Hammar, S. L.; Heicher, D. A. (Kauikeolani Children's Hosp., Honolulu, Hawaii). *Am. J. Dis. Child.* 128(3):401-404, 1974.

Idiopathic acute pancreatitis, which was clinically indistinguishable from Reye's syndrome occurred in 2 girls, aged 6 yr. Both children were entirely well 2 days before hospital admission when they developed the nonspecific symptoms of cough, coryza, sore throat, earache, and emesis. Both progressed to a comatose state characterized by severe hepatic dysfunction. Evidence of severe pancreatitis was also found at laparotomy in one and at autopsy in the other patient, who died on the 5th day of illness. However, the original diagnosis of Reye's syndrome could well be questioned in each case, for in case 1 fatty infiltration of only the liver was present, and in patient 2, no fatty changes in the viscera were found. It is not likely that the encephalopathy resulted from circulating pancreatic enzymes, as the patient who recovered had no neurological damage and the patient who died showed no evidence of brain digestion at autopsy. It is suggested that these examples of acute pancreatitis may represent one basic disease process whose more common form of presentation is that originally described by Reye, or conversely, that more than one disease process may give rise to similar clinical findings. It is felt that in the investigation of patients with a clinical picture suggesting Reye's syndrome, tests of pancreatic function should be included.

8717 PULMONARY HYPERTENSION IN ACUTE HEMORRHAGIC PANCREATITIS. *(E.)* Halmagyi, D. F. J.; Karis, J. H.; Stenning, F. G.; Varga, D. (Dept. Surg., Univ. Sydney, Australia). *Proc. Int. Symp. Gastrointest. Motility, 4th, 1973* pp. 637-642.

Acute hemorrhagic pancreatitis was induced in 8 greyhounds by effective surgical excision of the portion of duodenum just distal to the pylorus and including the major pancreatic duct, by ligation of the common bile duct and subsequent heparinization. The results were compared to changes in 5 sham-operated greyhounds. Pulmonary and femoral blood flows, systemic and pulmonary arterial blood pressures, blood gases, plasma levels of lactate, catecholamines, amylase, and glucose were measured prior to and for 24 hours following the interventions. Induction of pancreatitis was followed by gradual hypotension and 6 of 8 dogs were dead after 24 hr; all sham-operated dogs remained alive the next day. Neither hypovolemia nor activation of vasodilator agents could be identified as the cause of circulatory failure. In the pancreatitis group mean pulmonary arterial pressure was 26 ± 5 and in the sham-operated group 15 ± 4 mm Hg; pulmonary "wedge" pressure was 6 ± 5 mm Hg, cardiac index 2.2 ± 0.3 liters/min, and arterial blood gases were normal in both groups. In 3 human patients admitted for acute hemorragic pancreatitis, Swan-Ganz catheters were inserted and pulmonary arterial mean pressures were found to be 36, 22, and 32 mm Hg, resp., with normal (8-10 mm Hg) pulmonary "wedge" pressure and normal cardiac outputs. The similarity of these experimental findings with clinical results suggests that pulmonary hypertension is a hitherto unrecognized consequence of acute pancreatitis and that it is likely to be related to pulmonary arteriolar constriction secondary to the release of some vasoactive material from the injured pancreas.

8718 NASOGASTRIC SUCTION IN THE TREATMENT OF ALCOHOLIC PANCREATITIS. *(E.)* Levant, J. A.; Secrist, D. M.; Resin, H.; Sturdevant, R. A. L.; Guth, P. H. (Wadsworth VA Hosp. Ctr., Los Angeles, Calif.). *JAMA* 229(1):51-52, 1974.

Of 29 patients with mild to moderately severe acute alcoholic pancreatitis, 15 were randomly allocated to treatment with nasogastric suction and 14 to no-suction therapy. The mean age of the patients in the suction and no-suction groups was 41.6 and 44.4 yr, resp. Antibiotics, anticholinergics, and antacids were not used. There were no significant differences between the 2 groups in duration of the following: abdominal pain, abdominal tenderness, nausea, narcotic requirement, fever, and elevated serum and urine amylase levels. Although a larger proportion of patients treated with suction became pain-free within 2 days, the difference disappeared by the 3rd day. Treatment without suction was associated with earlier return of normal bowel sounds and smaller risk of prolonged hyperamylasemia (2 of 14 patients compared with 7 of 15 in the suction group). Because nasogastric suction provided no clear-cut advantages in this group, it might be considered elective rather than mandatory in the treatment of mild to moderately severe acute alcoholic pancreatitis.

8719 CURRENT DIAGNOSIS AND TREATMENT OF ACUTE PANCREATITIS. *(E.)* Spainhour, Jr., J. B.; Webster, III., P. D. (VA Hosp., Augusta, Ga.). *South. Med. J.* 67(11):1292-1296, 1974.

8720 OBJECTIVE EARLY IDENTIFICATION OF SEVERE ACUTE PANCREATITIS. *(E.)* Ranson, J. H. C.; Rifkind, K. M.; Roses, D. F.; Fink, S. D.; Eng, K.; Localio, S. A. (New York Univ. Sch. Med., N.Y.). *Am. J. Gastroenterol.* 61(6):443-451, 1974.

8721 ACUTE HEMORRHAGIC PANCREATITIS: THE PATHOLOGY OF EXPERIMENTAL CANINE PANCREATITIS. *(E.)* Khedroo, L. G. (Rush Univ. Med., Chicago, Ill.). *J. Abdom. Surg.* 16(11):305-308, 1974.

8722 THE SIGNIFICANCE OF FATTY LIVER IN ACUTE NECROTIZING PANCREATITIS. *(E.)* Pettersson, G.; Storck, G.; Edlund, Y. (Sahlgrensa Hosp., Univ. Goteborg, Sweden). *Scand. J. Gastroenterol.* 9(27): 36, 1974.

8723 THE CONCENTRATION OF AMYLASE IN PERITONEAL SECRETION AT LAPAROTOMY. *(E.)* Christoffersen, J.; Schmidt, A.; Voldstedt-Pedersen, P. (Community Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(27):37, 1974.

8724 CHANGES OF THE EXOCRINE FUNCTION OF THE PANCREAS IN GASTROENTEROLOGICAL PATIENTS. *(Rus.)* Bondar, Z. A.; Tuzhilin, S. A. (I. M. Sechenov 1st Med. Inst., Moscow, USSR). *Ter. Arkh.* 46(4):32-40, 1974.

8725 THE ROLE OF ALCOHOL IN CLINICAL ACUTE PANCREATITIS. *(E.)* Auranen, A.; Isomaki, M. (Turku Univ. Hosp., Finland). *Scand. J. Gastroenterol.* 9(27):32, 1974.

8726 THE SIGNIFICANCE OF DUODENAL DIVERTICULA IN PANCREATITIS. *(E.)* Lotveit, T.; Aune, S. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(27):32, 1974.

8727 PANCREATITIS AND HYPERLIPAEMIA. *(E.)* Carlsen, A.; Schmidt, A. (Community Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(27): 33, 1974.

8728 PANCREATITIS AFTER RENAL TRANSPLANTATION. *(E.)* Saker, B. M.; Hurst, P. E.; Haywood, E. F.; Brockis, J. G.; Golinger, D.; Van Merwyk, A.; House, A. K. (Roy. Perth Hosp., Western Australia). *Aust. NZ J. Med.* 4(3):305, 1974.

8729 ENTEROVIRUS INFECTION IN ACUTE PANCREATITIS. *(E.)* Ihse, I.; Arnesjo, B.; Eden, T.; Ursing, B. (Univ. Hosp., Lund, Sweden). *Scand. J. Gastroenterol.* 9(27):30, 1974.

8730 ACUTE PANCREATITIS, A NOVEL MANIFESTATION OF Mycoplasma pneumoniae INFECTION. *(E.)* Mardh, P. A.; Ursing, B. (Univ. Hosp., Univ. Lund, Sweden). *Scand. J. Gastroenterol.* 9(27):29-30, 1974.

8731 Mycoplasma pneumoniae ANTIGEN AND ACUTE PANCREATITIS. *(E.)* Pantzar, P.; Leinikki, P.; Tykka, H. (Helsinki Univ. Central Hosp., Finland). *Scand. J. Gastroenterol.* 9(27): 31, 1974.

8732 GLUCAGON IN THE TREATMENT OF PANCREATITIS. *(E.)* Jyrala, A.; Tykka, H.; Pantzar, P. (Helsinki Univ. Central Hosp., Finland). *Scand. J. Gastroenterol.* 9(27):37, 1974.

8733 PANCREATICO-JEJUNOSTOMY IN CHRONIC PANCREATITIS. *(E.)* Kugelberg, C.; Arjesjo, B.; Ihse, I. (Univ. Hosp. Lund, Sweden). *Scand. J. Gastroenterol.* 9(27):38, 1974.

8734 SURGICAL TREATMENT OF CHRONIC PANCREATITIS. *(E.)* Christiansen, J.; Nielsen, O. V. (Rigshosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(6):539-542, 1974.

8735 TRIAL OF A PEPTIDASE INHIBITOR (INIPROL) IN ACUTE PANCREATITIS. *(E.)* Liberman, S.; Hansky, J. (Prince Henry's Hosp., Melbourne, Australia). *Aust. NZ J. Med.* 4(3):303, 1974.

8736 EFFECT OF CHLOROPHYLL-A IN EXPERIMENTAL ACUTE PANCREATITIS. *(E.)* Orda, R.; Wiznitzer, T.; Bawnik, J. B.; Bubis, J. J. (Ichilov Munic.-Gov. Hosp., Tel Aviv, Israel). *Isr. J. Med. Sci.* 10(6):630-636, 1974.

8737 APPLICATION OF THERAPEUTIC AGENTS TO ALTER THE COURSE OF ACUTE HEMORRHAGIC PANCREATITIS IN DOGS. *(E.)* Khedroo, L. G. (Univ. Illinois Med. Ctr., Chicago). *Int. Surg.* 59(5):286-289, 1974.

8738 ACUTE COLONIC OBSTRUCTION SECONDARY TO PANCREATITIS. A CASE REPORT AND REVIEW OF THE LITERATURE. *(E.)* Carter, P.; Ali, S. D.; Calhoun, T.; Jurtz, L. H. (District Columbia Gen. Hosp., Washington, D. C.). *J. Natl. Med. Assoc.* 66(5):372-374, 1974.

8739 ACUTE PANCREATITIS DURING PREGNANCY AND THE POSTPARTUM PERIOD. *(Ger.)* Schwokowski, C. F.; Kothe, W.; Albert, H. (Surg. Clin., Univ. Leipzig, Germany). *Zentralbl. Gynaekol.* 96(30):940-945, 1974.

8740 HEPATIC BLOOD FLOW IN PATIENTS WITH PANCREATITIS SUBJECTED TO COMBINED TREATMENT INVOLVING ULTRASOUND. *(Rus.)* Grinberg, S. B.; Pleskacheva, L. A. (Tselinograd Med. Inst., USSR). *Ter. Arkh.* 46(4):40-45, 1974.

8741 PANCREATIC PSEUDOCYST. A REVIEW OF 17 CASES WITH EMPHASIS ON RADIOLOGIC FINDINGS. *(E.)* Komaki, S.; Clark, J. M. (Med. Coll. Wisconsin, Milwaukee). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 122(2):385-397, 1974.

See also, 8456, 8457, 8712, 8850.

LIVER AND BILIARY TRACT

8742 IDENTIFICATION OF α-ANTITRYPSIN IN LIVER CELLS OF PATIENTS WITH α_1-ANTITRYPSIN DEFICIENCY: ULTRASTRUCTURAL AND IMMUNOCYTOCHEMICAL STUDY. *(E.)* Feldmann, G.; Bignon, J.; Chahinian, P.; Guesnon, J.; Gilet, M. (INSERM, Beaujon Hosp., Clichy, France). *Digestion* 10(3):219-220, 1974.

Ultrastructural and immunocytochemical studies were conducted on liver specimens from 5 severely emphysematous adults with α_1-antitrypsin deficiency, 4 of whom were homozygous ZZ and 1, heterozygous FZ. Immunocytochemical techniques, using anti-α_1-antitrypsin antibodies labeled with horseradish peroxidase, demonstrated the presence of α_1-antitrypsin in liver cells. Deposits were seen in the lumens, membranes, and in ribosomes of the rough endoplasmic reticulum of hepatocytes. These findings suggest that in patients with α_1-antitrypsin deficiency, the protein is synthesized by the ribosomes but is not completely transported to the plasma, thus accumulating in the lumina of the rough endoplasmic reticulum.

8743 SYMPTOMS OF PRIMARY CANCER OF THE LIVER. *(Rus.)* Shain, A. A. (Tiumen Med. Inst., USSR). *Vopr. Onkol.* 20(9):50-56, 1974.

Clinicopathology of primary hepatic cancer was studied in 385 patients of whom 190 had opisthorchiasis. The main clinical symptoms included the pain sensation in the right subcostal region (95.3% of patients with opisthorchiasis, otherwise 96.1%); weakness, emaciation, loss of appetite (80.5, 70.4, 68.8% resp.); tumorous hepatomegaly syndrome (94.8 ± 1.1%) the size of the liver in 95 patients averaging 17.5 cm upon hospitalization; fever (69.9 ± 2.4%); ascites (44.7 ± 2.5%), and jaundice (35.1 ± 2.4%). There was a greater incidence of accumulation of serous fluid in the abdominal cavity in patients with cirrhosis-associated cancer (71.2 ± 5.9% against 45.5 ± 3.0% in noncirrhotic cancer). Autopsies of 220 patients with hepatic cancer showed jaundice in 84 (38.2%) caused in 50 cases (60%) by metastases in the periportal lymphatic nodules constricting the bile ducts. Tumorous hepatomegaly involved substantial enlargement of the liver, painful palpation, hardening and tuberosity of the surface tissues. No essential symptomatic differences were observed between opisthorchiasis primary cancer and cancer not associated with parasitic invasion. Splenomegaly was atypical of hepatic cancer and opisthorchiasis (4.9% of cases). Drug-resistant fever in opisthorchiasis is indicative of possible hepatic cancer.

8744 FATAL LIVER DISEASE OF UNKNOWN ORIGIN IN TWO ADOLESCENT BROTHERS. *(E.)* Theodor, E.; Ravid, M.; Jaffe, R.; Cohen, B. E. (Chaim Sheba Med. Ctr., Tel-Hashomer, Israel). *Am. J. Dis. Child.* 128(5):727-730, 1974.

Two brothers had repeated episodes of vomiting, hepatomegaly, and laboratory evidence of deranged liver function. Despite complete clinical recovery between attacks, the patients died in hapatic coma at the ages of 14 and 16 yr, resp., the younger 8 yr and the older 1 1/2 yr after onset of illness. Results of a liver biopsy performed on the older brother during an asymptomatic interval was normal. Autopsy, performed only on the younger brother, revealed a mild liver fibrosis linking the portal tracts and creating a lobular effect. The lobule showed pronounced fatty change that was most prominent at the periphery of the lobule. The droplets were microvesicular. Sudanophilic droplets were found in the proximal tubules of the kidney, especially in the renal medulla, and in the lungs. There was no evidence for chronic active hepatitis, recurrent or protracted hepatitis, hereditary fructose intolerance, or repeated exposure to toxins. Reye's syndrome was considered in view of the histological changes in the younger brother, but recurrent episodes of the syndrome in the same patient have not been reported. Additionally, neither brother showed hypoglycemia. Although fatal hemorrhage in a 3rd brother during circumcision may have been a manifestation of familial neonatal liver disease, the existence of a hereditary disorder was not confirmed.

8745 PRIMARY CAUSE OF DECREASED FUNCTIONAL RESERVE IN THE LIVER OF ICTERIC PATIENTS AND RATS. *(E.)* Ozawa, K.; Yamada, T.; Ida, T.; Yamaoka, Y.; Honjo, I. (Kyoto Univ. Fac. Med., Japan). *Surg. Gynecol. Obstet.* 139(3):358-362, 1974.

Biochemical studies of mitochondrial metabolism were conducted on hepatic tissue from adult male Wistar rats made icteric by ligation of the common bile duct and on hepatic biopsy specimens from 13 icteric patients. Phosphorylase activity/U of cytochrome a(+a_3), as determined by the change in pH resulting from conversion of ADP to ATP, fell to about 50% of control values following either common bile duct ligation or ligation of a branch of the portal vein. Partial hepatectomy, however, resulted in a 200% stimulation (compared with controls) in phosphorylase activity of hepatocyte mitochondria from rats subjected to bile duct ligation 3 weeks previously. This stimulation was felt to be due to enhanced portal blood supply to regenerating tissues. Hepatocyte mitochondrial phosphorylase activity/U of cytochrome a(+a_3) from icteric patients with low cytochrome a(+a_3) levels was considerably greater than that of nonicteric controls, while that from icteric patients with high cytochrome a(+a_3) levels was decreased. These findings in rats and icteric patients are explained on the basis of previous reports showing the presence in portal blood of a factor, possibly insulin, which stimulates liver mitochondrial oxidative phosphorylation. It is suggested that in rats the reduced phosphorylase activity in icteric liver is due to a decrease in the inherent sensitivity of the mitochondrial respiratory enzymes to this factor. The increase in phosphorylase activity in icteric patients with low cytochrome a(+a_3) may be a compensatory event produced by increased levels of portal blood stimulating factor.

8746 NON-PARASITIC LIVER ABSCESS.

(E.) Schraibman; I. G. (Infirm., Rochdale, England). *Br. J. Surg.* 61(9):709-712, 1974.

The clinical features of 15 cases of nonparasitic hepatic abscess verified at surgery or autopsy were studied. All patients were febrile at one time during the illness. Approximately 50% complained of abdominal pain. Nausea and vomiting occurred in a few and weight loss was significant only if there was a delay in diagnosis. Only 4 patients were jaundiced and in 3 the liver was easily palpable. White blood cell count was elevated (> 10,000) in 10 of 13 patients studied, and erythrocyte sedimentation rate was raised (> 20 mm/hr) in all 9 cases where it was measured. Elevated serum bilirubin and alkaline phosphatase were useful, but not diagnostic, studies; serum enzymes, however, were of no diagnostic value. Of particular interest was the fact that all 11 patients studied showed a reversal of the serum albumin:globulin ratio (< 1) and in only 1 case was serum albumin > 3 g%. Also of significant diagnostic value was the liver scan which showed a filling defect in 4 of 4 patients in which it was done. A lesion into the abdominal cavity was found in 9 patients and could have been the source of infection resulting in hepatic abscess. In none of the 7 patients who died, was the diagnosis of hepatic abscess suspected before death. Treatment was by drainage in 10 patients, 8 of whom recovered. No patients with multiple small abscesses survived.

8747 PATHOLOGY AND PATHOGENESIS OF LIVER DISEASE IN ALPHA-1-ANTITRYPSIN DEFICIENT INDIVIDUALS.

(E.) Aagenaes, O.; Fagerhol, M.; Elgjo, K.; Munthe, E.; Hovig, T. (Rikshosp., Oslo, Norway). *Postgrad. Med. J.* 50(584):365-375, 1974.

Of 6 pediatric patients hospitalized with liver disease, biliary atresia was suspected in 3 and umbilical bleeding was present in 2. Laboratory studies showed an increase in transaminase, alkaline phosphatase, serum bilirubin and bile acids; there was also some increase in serum lipids and steatorrhea. The diagnosis in all cases was intrahepatic cholestasis. Past history disclosed low average birth weights of 3,000 g. Previously reported infants with known α_1-antitrypsin deficiency who did not develop neonatal liver disease had normal birth weights. Thus, the low birth weights in the present study could be explained by developing liver disease in the fetus. After the cholestasis subsided, the liver continued to be enlarged and firm, having the picture of a slowly progressing cirrhosis. It is suspected that 10-20% of the children with α_1-antitrypsin deficiency have liver disease. It is suggested that cirrhosis develops in these individuals through a metabolic or nutritional mechanism: the liver becomes damaged because its cells cannot secrete an abnormal protein synthesized from a mutation at the locus for the α_1-antitrypsin structural genes.

8748 BIOCHEMICAL ABNORMALITIES IN REYE'S SYNDROME.

(E.) Alvira, M.; Forman, D. T. (Evanston Hosp., Ill.). *Anal. Clin. Lab. Sci.* 4(6): 477-483, 1974.

Sera from 9 children (aged 7 months to 8 yr) with Reye's syndrome confirmed at autopsy were examined prior to death. Four patients presented with serum hypoglycemia and decreased glucose concentration in cerebrospinal fluid. Serum potassium was elevated in all cases, urea nitrogen in 7, and creatinine, uric acid, and ammonia in 5. Arterial blood gas analyses showed a negative base excess in 9 patients and a decreased pH in 5. Hypocapnia was present in 8 cases and mild hypoxemia in 40%. All patients tested had a marked increase of serum aspartate and alanine aminotransferase, lactic dehydrogenase, and creatine phosphokinase. Biochemically, these changes may be explained by a sudden insult to the intracellular respiration causing an increased tissue metabolism resulting in an elevated endogenous nitrogen load. The consistent elevation of creatine phosphokinase implies a severe impairment of oxidative metabolism. Studies of creatine phosphokinase isoenzymes in 2 children showed marked elevations in sketetal muscle and minor increases in heart. While this may be due to the observed primary hypoxemia and hypocapnia, the severe mitochondrial injury seen in 3 patients suggests a mitochondrial origin of creatine phosphokinase in these patients. Serum gamma-glutamyl transpeptidase activity and bilirubin concentrations were not increased in this group, indicating that liver damage in Reye's syndrome is not as important a factor as has been reported. Preliminary findings of an ongoing study indicate a progressive rise in creatine phosphokinase is associated with a grave prognosis.

8749 FIVE-YEAR FOLLOW-UP STUDY OF PATIENTS WITH NONALCOHOLIC AND NONDIABETIC FATTY LIVER.

(E.) Massarrat, S.; Jordan, G.; Sahrhage, G.; Korb, G.; Bode, J. C.; Dolle, W. (Med. Polyclin., Phillips Univ., Marburg/Lahn, Germany). *Acta Hepatogastroenterol.* 21(3):176-186, 1974.

Ninety-two patients with histologically verified fatty liver but without diabetes mellitus or a history of excessive alcohol consumption underwent follow-up examination 40.8 (± 7.3) months after initial presentation (first observation period). A 2nd liver biopsy was performed on 56 of these patients. In addition to the clinical examination, the following data were obtained: degree of overweight, transaminase activities, alkaline phosphatase, BSP retention after 45 min, serum electrophoresis, bilirubin, cholesterol, blood sugar, and glucose assimilation coefficient. Fat accumulation in the liver was assessed histologically. Liver and spleen scans were made of the 65 patients who were examined as outpatients 2 yr later (second observation period). In spite of the continuing heavy deposition of fat in the liver of some patients, clinical, chemical (during both observation periods), or histological data (first period) showed no transition to liver cirrhosis. At the last examination, 7 patients had fasting blood sugar levels of more than 100 mg%, but only 1 had to be treated dietetically for diabetes mellitus.

8750 MARKED FATTY LIVER ASSOCIATED WITH HYPOTHALAMIC LESIONS - TWO AUTOPSY CASES. *(E.)*

Miyasaki, K.; Miyachi, Y.; Ooiso, Y. (Kobe Univ. Sch. Med., Japan). *Acta Pathol. Jap.* 24(3):405-412, 1974.

Fatty liver was noted as a common finding in a 24-yr-old housewife with diabetes insipidus and autopsy findings of superior pharyngeal carcinoma with metastasis to the base of the skull, from the right inner ear to pituitary, sella turcica, and hypothalamus, and to the liver, and in a 45-yr-old housewife with marked hyperorexia, obesity, and autopsy findings of encephalomalacia of the hypothalamus. No clinical records on special food habits were available. In both cases, amenorrhea, endometrial atrophy of the uterus and no Graafian follicles in ovaries were found. It is suggested that changes of some releasing hormones in the hypothalamus may influence the metabolism of neutral fat. It may be possible to postulate a center for the regulation of neutral fat metabolism in the hypothalamus.

8751 AN AUTOPSY CASE OF CONGENITAL HEPATIC CELL TUMOR.

(E.) Okayasu, I.; Mori, W.; Hatanaka, M. (Tokyo Med. Dental Univ., Japan). *Acta Pathol. Jap.* 24(3):387-392, 1974.

A congenital hepatic cell tumor was found in a female newborn autopsied 4 hr after birth. The infant was born of a 37-yr-old woman who had no contributing history except for having taken a diuretic at the terminal stage of the pregnancy for late pregnancy toxicosis. The tumor was small hen-egg sized, whitish grey in color, rather soft in consistency, and located at the middle part of the right lobe of the liver. The tumor cells resembled fetal hepatic cells, showing a regular, cord-like arrangement probably of 2-cell thickness. The most conventional diagnosis for this tumor would be hepatoblastoma. However, neither sarcomatous spindle cells nor bone and cartilage tissue, which are often seen in hepatoblastoma, were found in this tumor. It is concluded that the tumor described occupies a specific position among hepatic tumors because it is congenital, has no distinctive capsule, has a close resemblance histologically to fetal hepatic cells, and has a higher degree of extramedullary hematopoiesis than adjacent normal liver tissue.

8752 STUDIES OF HEMOLYSIS USING LABELING WITH ^{51}Cr IN CHRONIC DISEASES OF THE LIVER.

(Rus.) Akzhigitova, F. N.; Zolotnitskaia, R. P.; Belousova, N. D. (I. M. Sechenov 1st Moscow Med. Inst., USSR). *Ter. Arkh.* 46(4):75-79, 1974.

8753 THE ENZYMES OF THE HEPATOBILIARY TRACT: A BIOCHEMICAL AND CLINICAL COMPARISON.

(E.) Batsakis, J. G. (Univ. Michigan Med. Ctr., Ann Arbor). *Ann. Clin. Lab. Sci.* 4(4):255-265, 1974.

8754 THE HAEMOLYTIC ANAEMIA OF WILSON'S DISEASE.

(E.) Iser, J. H.; Stevens, B. J.; Stening, G. F.; Hurley, T. H.; Smallwood, R. A. (Austin Hosp., Heidelberg, Australia). *Aust. NZ J. Med.* 4(3):304, 1974.

8755 THE ACTIVITY AND SUBCELLULAR LOCALIZATION OF SO-CALLED BILIARY TRACT ENZYMES IN LIVER NEEDLE BIOPSIES FROM CONTROL SUBJECTS AND THOSE WITH CHRONIC LIVER DISEASE.

(E.) Peters, T. J.; Seymour, C. A.; Neale, G. (R. Postgrad. Med. Sch., London, England). *Digestion* 10(4/5):374, 1974.

8756 SELENIUM: A REVIEW.

(E.) Coles, L. E. (Inst. Preventive Med., Cardiff, Wales). *J. Assoc. Public Anal.* 12:68-72, 1974.

See also, 8148, 8348, 8425, 8432, 8433, 8434, 8436, 8437, 8439, 8440, 8441, 8460, 8461, 8462, 8463, 8464, 8471, 8574, 8622, 8716, 8722, 8861, 8891, 8901, 8902, 8903, 8909.

Hyperbilirubinemic States

8757 CONJUGATED HYPERBILIRUBINEMIA IN EARLY INFANCY. A REASSESSMENT OF LIVER BIOPSY.

(E.) Brough, A. J.; Bernstein, J. (Wayne State Univ. Sch. Med., Detroit, Mich.). *Human Pathol.* 5(5):507-516, 1974.

Liver biopsy was performed in 158 cases to differentiate biliary obstruction from hepatocellular disease in the evaluation of conjugated hyperbilirubinemia in newborns and young infants. There were 195 biopsy specimens, of which 98 were percutaneous needle and 97 were open wedge biopsies. In this series there were 10 misdiagnoses (6.3%) which could have been reduced to 4.4%. Diagnostic error resulted from the misinterpretation of ductal abnormalities: from the "over-reading" of bile duct proliferation in 9 children shown subsequently to recover from their jaundice; and from the "under-reading" in 1 child shown subsequently to have biliary tract obstruction. Under-reading is infrequent, while over-reading is a major cause of histopathologic error. Marked bile duct proliferation may also obscure the histologic appearance of α_1-antitrypsin deficiency. To accurately evaluate hepatocellular disease, the histopathologist should be alert not only to the absence of an inflammatory cell response suggesting the possibility of metabolic disease, but also to a deficiency of intrahepatic bile ducts which may be an indication of abnormalities in bile salt metabolism. The major difficulty in this series was caused by the occasional occurrence of bile duct proliferation in hepatitis; its presence is therefore not specific for biliary tract obstruction. It is suggested that bile duct proliferation in hepatitis results from transient or segmental cholangiolar injury with resultant, perhaps temporary, obstruction.

8758 CONGENITAL DYSERYTHROPOIETIC ANEMIA AND THE DUBIN-JOHNSON SYNDROME.

(E.) Clauvel, J. P.; Erlinger, S. (St. Louis Hosp., Paris, France) *Gastroenterology* 67(4):686-690, 1974.

The clinical and laboratory features of a patient suffering from the Dubin-Johnson syndrome and type II congenital dyserythropoietic anemia are described. Deep jaundice was noticed at birth. At age 26 yr, he was admitted for additional investigation of the jaundice which had persisted with varying intensity. Electron microscopy revealed a double cell membrane, probably originating from the endoplasmic reticulum, in the periphery of most of the late erythroblasts. At phase contrast microscopy of the ghost, pieces of this membrane remained in 43% of the mature red cells. Serological studies showed the red cells were strongly agglutinated by anti-i and anti-I sera. Red cell survival was slightly shortened. Iron incorporation into erythrocytes was decreased and surface counting showed predominant bone marrow uptake. Serum total bilirubin was 44 mg/100 ml; SGPT, 110 Karmen U; alkaline phosphatase, 11 KA U. Histological examination of a needle biopsy specimen showed normal liver architecture and the presence, chiefly periportal, of abundant dark brown pigment in hepatocytes. There was slight portal fibrosis, mild steatosis, and iron in periportal liver cells, all resulting from iron overload. The hematological findings correspond well with type II congenital dyserythropoietic anemia. A secondary rise in plasma bromsulphalein concentration was noted after a single injection, characteristic of the Dubin-Johnson syndrome. Likewise the brown pigment observed at optical microscopy in parenchymal liver cells was also characteristic of the Dubin-Johnson syndrome. The association of an increased bilirubin production (chiefly due to ineffective erythropoiesis) and an impaired biliary excretion of bilirubin (as a result of the Dubin-Johnson syndrome), probably accounted for the very high bilirubin level.

8759 THE USE OF PHOTOTHERAPY IN NEONATAL JAUNDICE.

(E.) Rusu, O.; Stambler, S.; Milcoveanu, E.; Taulescu, G.; Kehaian, M.; Herscovici, P.; Sufrin, W. (Polizu Clin. Hosp., Bucharest, Rumania). *Rom. Med. Rev.* 18(1):56-61, 1974.

A follow-up study was performed on 450 neonates treated for jaundice by phototherapy. Jaundice was separated into the following categories: hyperbilirubinemic jaundice without isoimmunization; jaundice due to ABO incompatibility; and jaundice due to Rh incompatibility. Premature infants with hyperbilirubinemic jaundice were exposed 3 days after birth. Infants with isoimmunization-caused jaundice were exposed during the first 3 days of life. In 38.46% of the cases, barbiturates were combined with phototherapy. The duration of treatment averaged 3.1 days. Phototherapy was effective in treating neonatal hyperbilirubinemic jaundice by accelerating the process of bile pigment clearance and preventing hyperbilirubinemia from reaching the danger threshold. Serum bilirubin values fell during treatment by 61-69%. In jaundice due to isoimmunization, phototherapy served only as an adjuvant method, major clearance being obtained by exsanguinotransfusion. However, in cases of severe isoimmunization, phototherapy lowered the number of repeated exsanguinotransfusions by almost 50%. The incidence of nuclear jaundice at necropsy in 2 periods of the same length, before and after phototherapy, showed a significant decrease in the incidence of this pathologic condition. The treatment itself was well tolerated by children. Transient hyperthermia with agitation occurred in 13 cases (3%), digestive disturbances in 37 cases (8.2%), and skin color changes in 10 cases (2%). Premature interruption of phototherapy caused a strong hyperbilirubinemia rebound in 29 cases (8%). In the course of phototherapy, serum bilirubin values must be determined at regular intervals of 8-12 hr. Attenuation of the jaundice does not reflect actual values of circulating bilirubin. Critical levels may be reached although masked by fading of the jaundice following exposure to light.

8760 PHOTOTHERAPY OF NEONATAL HYPERBILIRUBINEMIA: BILIRUBIN IN UNEXPOSED AREAS OF THE SKIN.

(E.) Vogl, T. P. (Magee-Woman's Hosp., Pittsburgh, Pa.). *J. Pediatr.* 85(5):707-710, 1974.

The effect of shading small areas of the skin with opaque patches during continuous phototherapy was studied in 35 infants. Two patches, 4 cm square, were applied to each infant, one over the sternal area and one on the center of the back. While the serum bilirubin concentration was rising, the range of equivalent serum bilirubin concentrations between patched and unpatched areas was 0.0-8.5 mg/100 ml, average 3.5 mg/100 ml. During periods of declining serum bilirubin concentrations, the values of equivalent serum bilirubin concentration for patched and exposed areas were 1-11 mg/100 ml, average 5.7 mg/100 ml. Analysis of the color differences between patched and exposed skin areas, for the periods of rising and falling serum bilirubin concentration for each infant, ranged from -6.5 to 8.9 mg/100 ml, average 2.2 mg/100 ml. No correlation was found between the color difference observed and any of the following factors: sex, cause of jaundice, direct and indirect Coombs tests, duration of phototherapy, breast *versus* bottle fed, gestational age, and history of asphyxia. After termination of phototherapy, the color differences between patched and unpatched areas faded slowly over a period of at least 3 hr. The fact that any color difference at all in the skin can be maintained over an area as small as 4 cm square indicates that the bilirubin is rather firmly bound in the tissue and relatively uninfluenced by serum bilirubin concentrations. This represents a potent defense mechanism of the body against bilirubin encephalopathy, since the bilirubin is liberated from serum albumin when it migrates into the tissue and the albumin is then free to bind additional bilirubin released from the reticuloendothelial system, while the bilirubin in the skin is not easily available to re-enter the bloodstream. The idea that bilirubin leaves the vascular space more easily than it reenters it is supported by the finding that the color difference is greater during times of decreasing than in times of increasing serum bilirubin concentration, when the tissue appears to more readily absorb bilirubin from the vascular space. This study supports the theory that the principal site of action of phototherapy is in the skin. From the width of the color transition region at the edge of the patch (1 or 2 mm) in the presence of an extended light source, the maximum depth of action of the light was determined to be less than 2 mm by a construction from geometric optics.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

8761 ACUTE HEPATOTOXICITY OF TANNIC ACID ADDED TO BARIUM ENEMAS. *(E.)* Eshchar, J.; Friedman, G. (Asaf Harofe Government Hosp., Zerifin, Israel). *Am. J. Dig. Dis.* 19(9):825-829, 1974.

The possible harmful effects of 1% tannic acid in 1,500 ml of barium sulfate used for barium enemas were evaluated. Liver function tests were performed before and after x-ray examination in 2 groups of unselected patients: 50 patients (26 women and 24 men, aged 10-78 yr) without prior evidence of liver damage (group A), and 11 subjects (7 women and 4 men, aged 20-72 yr) with liver damage (group B). In group A mild rises in transaminases appeared in 3 patients: 1 with apparent coronary ischemia; and the 2nd due to prolonged retention of the contrast material for more than half an hour. The 3rd patient was a boy, aged 11 yr, and was the only patient to experience a rise in both SGOT and SGPT. Of the 11 patients in group B, 4 showed deterioration of liver function tests, particularly in BSP retention (3 cases) and alkaline phosphatase (1). Thus, barium enemas containing 1% tannic acid do not cause liver damage in adults, provided the colonic lesion is neither extensive nor severe, and there is no evidence of preceding liver damage. Caution must be exercised when administering tannic acid to persons with impaired liver function. Tannic acid should not be used where retarded evacuation of the bowel is to be clinically expected. The effect of tannic acid in adults with disturbed liver function and in children requires further evaluation.

8762 HEPATITIS FOLLOWING ACTINOMYCIN D AND IRRADIATION. *(E.)* Harris, F.; Cullity, G.; Lister, J. (Children's Hosp., Sheffield, England). *Proc. R. Soc. Med.* 67(8):756-757, 1974.

A boy (aged 2 yr and 9 months) was hospitalized with hematuria and a right loin mass. A nephroblastoma was removed by nephroureterectomy and actinomycin D (180 μg, 15 μg/kg) was given immediately and for 3 subsequent days. Radiotherapy was begun 10 days after operation and continued for 3 weeks. A total dose of 3250 rads was given to the right hemiabdomen from hemidiaphragm to sacral promontory. After 2 months time a right renal bed abscess required drainage and he was admitted with acute generalized edema and ascites. Liver function tests showed bilirubin 1.7 mg/100 ml, SGOT 360 and SGPT 200 milliunits/ml. Despite albumin infusions and diuretics, liver functions deteriorated further and the ascites required drainage. Thrombocytopenia persisted. Two weeks after laparotomy, radiographs showed elevation of the left hemidiaphragm. Liver function gradually improved and 12 weeks after biopsy only minimal uptake in the right hepatic lobe was noted on liver scan with markedly increased left lobe uptake. After 18 months, the platelet count rose to normal and the liver function also normalized. Such cases of severe radiation hepatitis in children are rare. There is evidence from animal studies that pretreatment with actinomycin D sensitizes the skin and gut to radiotherapy and increases the morbidity when radiation is directed to these tissues. When using the combined techniques of surgery, radiotherapy and chemotherapy, the timing of each individual procedure in relation to the others may be far more critical than previously supposed. This is particularly important in treating children where a permanent loss of growth in specific tissues can have exceedingly serious effects as the rest of the child matures.

8763 HEPATIC TOXICITY OF NITROSOUREA ANALOGUES. *(E.)* Lokich, J. J.; Drum, D. E.; Kaplan, W. (Children's Cancer Res. Fdn., Boston, Mass.). *Clin. Pharmacol. Ther.* 16(2):363-367, 1974.

A 70-yr-old man with carcinoma of the colon and a 66-yr-old man with carcinoma of the pancreas developed a mild hyperbilirubinemia with little alteration of serum enzymatic activity in association with combined streptozotocin and 1,3-bis(2-chloromethyl)-1-nitrosourea therapy. Hepatic scintigraphy revealed severe, reversible depression of radiocolloid uptake by hepatic phagocytes, suggesting that normal phagocytic function is sensitive to some toxic effects of these drugs. The pathological finding of hepatocyte necrosis was typical for subacute hepatitis and persisted in spite of clinical recovery. Recovery of phagocyte function may precede hepatocyte reconstitution, thus accounting for the disparate clinical and pathologic effects.

8764 TOXIC AND ALLERGIC LESIONS OF HEPATOBILIARY TRACT IN WORKERS HANDLING EPOXIDE COMPOUNDS. *(Rus.)* Parpalei, I. A. (Kiev Med. Inst., USSR). *Vrach. Delo* (8):134-137, 1974.

Clinical investigation of 110 persons handling epoxide compounds and 25 controls revealed hepatic changes involving enlargement of the liver, pain syndrome and dyspeptic discomfort in 49% of the cases and 4% of the controls. Hypergammaglobulinemia (23.6 ± 0.6%) was found in 58% of cases. Liver scanning and ^{198}Au-labeled hepatography revealed reticuloendothelial and vascular involvement. The isotope accumulation period reached 21 ± 2.5 min (compared with the normal of 10 min). Disorders of the hepatic blood supply tended to be more pronounced in the workers with a longer record of handling epoxide compounds. Positive intracutaneous tests with albumin and epoxide resin allergen were found in 83% of cases and none in controls. Antibody titration against albumin-epoxide complex ranged from 1:64-1:254; antihepatic antibodies, 1:64-1:508. Liver biopsy revealed various degrees of hepatitis in all workers handling epoxide compounds. The changes in the hepatobiliary system are classified as having toxic and allergic origin.

8765 HALOTHANE HEPATITIS — A REPORT OF FIVE CASES. *(E.)* Paull, A.; Hall, P.; Grant, A. K. (Queen Elizabeth Hosp., Adelaide, South Australia). *Aust. NZ J. Med.* 4(3):304, 1974.

8766 THE FUNCTION OF THE LIVER IN WORKERS HANDLING CHLORPROMAZINE AND SOME OTHER SUBSTANCES. *(Rus.)* Liubchenko, D. N.; Drozdova, G. A.; Borodulina, O. V.; Boiarchuk, Z. I.; Turaev, R. N.; Dubova, V. G. (M. F. Vladimirsky Region. Clin. Inst., Moscow, USSR). *Gig. Tr. Prof. Zabol.* (9):47-48, 1974.

8767 ULTRASTRUCTURAL CHANGES IN THE LIVER OF METHOTREXATE-TREATED PATIENTS WITH PSORIASIS. *(E.)* Horvath, E.; Kovacs, K.; Ross, R. C. (St. Michael's Hosp., Toronto, Canada). *Eur. J. Clin. Invest.* 4(5):319, 1974.

See also, 8336, 8374.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

8768 DIFFERENCES BETWEEN AUSTRALIA ANTIGEN POSITIVE (VIRUS B) AND AUSTRALIA ANTIGEN NEGATIVE (VIRUS A) HEPATITIS. *(E.)* Sama, S. K.; Tewari, S. G. (All-India Inst. Med. Sci., New Delhi). *Indian J. Med. Res.* 62(5):749-755, 1974.

Fifty-six adult patients with a diagnosis of viral hepatitis were studied. Patients with serum positive for hepatitis associated antigen (HBAg) or antibody to HBAg were taken as cases of virus 'B' hepatitis, while those having serum negative for both HBAg and antibodies to HBAg were considered as suffering from virus 'A' hepatitis. HBAg and antibody to HBAg in the serum were studied by agar gel diffusion, counter electrophoresis and solid phase sandwich radioimmunoassay. Twenty-six cases were determined to be virus A and 30 to be virus B hepatitis. The clinical picture and natural history of the 2 types of hepatitis are compared. Virus A hepatitis is short incubation or infectious hepatitis, and virus B hepatitis is long incubation or serum hepatitis. The majority of virus B hepatitis cases have an insidious onset. Anorexia, nausea, vomiting and fever are less frequent in virus B hepatitis and a fair number of patients have jaundice as the first manifestation. Cholestasis is more frequent in virus B hepatitis. Fulminant course with fatal outcome and chronic course are predominantly the features of virus B hepatitis. Virus A hepatitis is relatively benign with quick recovery in most of the cases.

8769 PITFALLS IN THE STUDY OF HEPATITIS A. *(E.)* Almeida, J. D.; Gay,. F. W.; Wreghitt, T. G. (Wellcome Res. Lab., Beckenham, England). *Lancet* (7883):748-750, 1974.

Fecal and serum samples from 12 cases of infectious hepatitis were examined by immune electron microscopy and double diffusion in agar gel. Electron microscope results were not interpretable for fecal extracts treated with acute sera, but extracts reacted with convalescent sera contained distinctive aggregates with the appearance of immune complexes. No one type of structure predominated in these aggregates. All 12 fecal samples produced precipitin lines against some of the sera tested, with 7 extracts giving lines only to recovery serum. Of the 11 paired sera reacted with fecal extracts producing strong lines only against convalescent serum, 6 showed seroconversion to 1 or more antigens in the extracts. Seroconversion was also observed in some control fecal extracts. A reaction of identify was obtained between an antigen detected in the feces of infectious hepatitis cases, the feces of a patient with obstructive jaundice due to carcinoma of the pancreas, and pooled human globulin. The results illustrate the multiplicity and nonspecificity of the immune reaction in hepatitis.

8770 PLEURAL EFFUSION, RASH, AND ANERGY IN ICTERIC HEPATITIS. *(E.)* Owen, R. L.; Shapiro, H. (Sch. Med. Univ. California, San Francisco). *N. Engl. J. Med.* 291(18):963, 1974.

A 42-yr-old patient had a clinical course characteristic of self-limited type A viral hepatitis but presented with pleuritic pain, pleural effusion, and transient hematuria. During his acute illness the patient developed a papulovesicular skin rash and transitory cutaneous anergy, a rarely reported feature of viral hepatitis. The rash may have been complement mediated; serum complement (C3) was subnormal when it appeared. The effusion and anergy may have been part of a serum-sickness-like prodrome of viral hepatitis. Two prospective studies have indicated that effusion may be more usual in hepatitis than is commonly recognized. Early recognition of effusion may enable clinicians to determine whether tissue damage is indeed mediated by complement.

8771 LONG-INCUBATION POST-TRANSFUSION HEPATITIS WITHOUT SEROLOGICAL EVIDENCE OF EXPOSURE TO HEPATITIS-B VIRUS. *(E.)* Prince, A. M.; Brotman, B.; Grady, G. F.; Kuhns, W. J.; Hazzi, C.; Levine, R. W.; Millian, S. J. (New York Blood Ctr., N.Y.). *Lancet* (7875):241-245, 1974.

An agent other than hepatitis B (HB) virus seemed to be the cause of 36 (71%) of 51 cases of post-transfusion hepatitis identified during prospective biweekly serological follow-up of 204 cardiovascular patients. The sera of the 36 cases showed no evidence of the antigen or antibody response expected to accompany infection by HB virus and to be detectable by the sensitive assays used. Incubation periods and clinical and epidemiologic features were not consistent with hepatitis A. Cytomegalovirus-associated seroconversion was no more common among the HB-negative cases than among HB-positive cases or among patients who did not develop hepatitis. The data suggest that a large proportion of long-incubation posttransfusion hepatitis is unrelated to hepatitis B and that control of posttransfusion hepatitis will require identification of a hepatitis virus(es) type C.

8772 ASSESSMENT OF THE SENSITIVITY AND SPECIFICITY OF THE AUSRIA-125 KIT FOR DETECTION OF HEPATITIS-B ANTIGEN. *(E.)* Gera, K. L.; McKeering, L.; Halliday, J. W.; Powell, L. W. (Roy. Brisbane Hosp., Australia). *Aust. NZ J. Med.* 4(3):305, 1974.

The Ausria-125 radioimmunoassay kit for rapid detection of hepatitis B antigen (HBAg) was compared with the solid-phase radioimmunoassay (SPIRA) method. Of 331 sera, the SPIRA method detected 8 (2.4%) specifically positive for HB Ag compared with 9 (2.7%) detected by the Ausria-125 kit. Detection rates for counter-electrophoresis and agar gel diffusion were 0.9% and 0.06%, resp. The results indicate that the Ausria kit is probably as sensitive as other radioimmunoassay methods. However, doubtful results should be checked by the SPIRA or hemoagglutination techniques.

8773 TRANSPLACENTAL TRANSMISSION OF HEPATITIS-B VIRUS BY SYMPTOM-FREE CHRONIC CARRIER MOTHERS. *(E.)* Papaevangelou, G.; Hoofnagle, J.; Kremastinou, J. (Univ. Athens Med. Sch., Greece). *Lancet* (7883):746-748, 1974.

Transplacental transmission of hepatitis-B surface antigen (HB_sAg) and of hepatitis B virus was studied in 12 symptom-free chronic HB_sAg carrier mothers and their 15 babies. HB_sAg was present in the sera of the mothers throughout the study (at delivery and 3 and 6 months later). HB_sAg was detected in the cord blood of 3 of the 15 children, but subsequently was not detected except in 1 child who first became HB_sAg-positive at age 6 months. Antibody to HB_sAg was not demonstrated in the mothers or in their children during the first 6 months of life. Antibody to the core antigen (anti-HB_c) was always present in carrier mothers and in cord blood, but it disappeared from the sera of the newborns shortly after birth. These data indicate that children of chronic HB_sAg mothers generally do not become infected with hepatitis B virus before or at birth despite the known intense exposure to HB_sAg from the mother. Whether anti-HB_c is responsible for avoidance of infection is not known.

8774 FAMILIAL CLUSTERING OF HEPATITIS B ANTIGEN: A STUDY IN RELATIVES OF PATIENTS WITH LIVER DISEASE AND HEPATITIS B ANTIGENAEMIA. *(E.)* Bruguera, M.; Bosch, J.; Rodes, J.; Pedreira, J. (Clin. Prov. Hosp., Barcelona, Spain). *Br. Med. J.* 5929(3):495-497, 1974.

Of 100 family contacts of 29 patients with transient and persistent hepatitis B antigenemia, 12 were positive for hepatitis B antigen (HBAg). No relation was found between familial clustering and the nature of liver disease or the duration of antigenemia in the index cases. Eight of the affected relatives were apparently healthy HBAg carriers, 1 had cirrhosis, and 3 (in the same family) developed acute viral hepatitis. Sera from all positive members of 4 families (10 cases) were subtyped by agar gel difusion. Members of 2 families had subtype *ad* and those of the other 2 families had subtype *ay*. This finding together with the absence of parenteral exposure in the HBAg-positive family contacts suggests a nonparenteral spread of HBAg in families of patients with HBAg-associated liver diseases.

8775 TRANSMISSIBLE DISEASE AND BLOOD TRANSFUSION. *(E.)* Dodd, R. Y. (Blood Res. Lab., American Natl. Red Cross, Bethesda, Md.). *Science* 186(4169):1138-1139, 1974.

Recent studies indicate that the Dane particle is the infectious virion of hepatitis B. The specific nucleotide polymerase in the inner core of the Dane particle can be precipitated from serum specimens by prior treatment with serum containing antibodies to hepatitis B surface antigen (HB$_s$Ag). Antibody to the core is found in almost all HB$_s$Ag carriers and in certain HB$_s$Ag-negative donors implicated in cases of posttransfusion infectious hepatitis B. Other diseases with potential relevance to blood transfusion are Epstein-Barr virus and cytomegalovirus. Both are widely distributed in the normal population, and serologic or clinical evidence of exposure is frequently found in transplant or transfusion recipients. An association has been demonstrated between the number of transfused leukocytes and cytomegalovirus infection in the recipient. Other viruses potentially transmissible by transfusions are arboviruses and slow viruses. Parasitic diseases must be considered when potential blood donors have a history of residence in tropical areas.

8776 RECIPIENT'S HEPATITIS, AN INEVITABLE SIDE-EFFECT OF BLOOD TRANSFUSION. *(E.)* Fiedler, H. (German Red Cross Blood Transfusion Service, Munster). *Vox Sang.* 26(4):368-371, 1974.

In 37 cases of posttransfusion hepatitis, the recipient's blood was hepatitis-associated antigen (HAA)-positive in 13 cases, negative in 10 cases, and not tested in 14 cases. In the 13 cases of confirmed posttransfusion hepatitis type B, at least 1 HAA-positive donor was found by radioimmunoassay in 3 cases (23.1%) and 2 by electron microscopy in 5 cases (40.0%). No donor blood was HAA-positive on counterelectrophoresis. Overall rates of posttransfusion hepatitis were considerably higher in operated than in nonoperated patients. The results suggest that an unknown percentage of so-called posttransfusion hepatitis cases is due to extrahematogenic infections. In these cases the manifestation of the disease is apparently due to the patient's temporarily enhanced susceptibility rather than to the relatively small virus dose.

8777 ASYMPTOMATIC HEPATIC DISEASE IN BLOOD DONORS WITH HEPATITIS B ANTIGENEMIA. *(E.)* Vittal, S. B. V.; Dourdourekas, D.; Shobassy, N.; Gerber, M.; Telischi, M.; Szanto, P. B.; Steigmann, F.; Clowdus, B. F. (Cook County Hosp., Chicago, Ill.). *Am. J. Clin. Pathol.* 62(5):649-654, 1974.

Thirty asymptomatic blood donors were found to be positive for hepatitis-B antigen (HBAg) in a routine screening operation with counterimmunoelectrophoresis and solid-phase radioimmunoassay. All donors were 16-55 yr-old males, 4 of whom were volunteers and 26 paid donors. The donors had no history suggestive of hepatitis and no antibody to HBAg. Three were heroin addicts and 6 had histories of considerable alcoholic intake. All 30 donors had demonstrable biochemical and histologic abnormalities of the liver but remained asymptomatic throughout the period of HB antigenemia, which ranged from 13-72 weeks. Leukocyte migration inhibition was normal in 16 subjects and only slightly depressed in 4, indicating that depression of the cell-mediated immune response is not the cause of this clinical state. Regular long-term biochemical and histologic assessment of these individuals is planned to determine the natural course of this condition.

8778 DISTRIBUTION PATTERNS OF HEPATITIS B ANTIGEN IN THE LIVER. IMMUNOFLUORESCENCE STUDIES. *(E.)* Akeyama, T.; Kamada, T.; Koyama, M.; Abe, H. (Osaka Univ. Med. Sch., Japan). *Arch. Pathol.* 98(4):252-256, 1974.

The localization and distribution patterns of hepatitis B antigen (HBAg) in the liver of patients with various liver diseases were examined by a direct immunofluorescent antibody technique. A specific fluorescence was observed in 21 of 23 HBAg seropositive cases, in none of 14 HBAg seronegative cases, and in 4 HBAb seropositive cases. The fluorescence was mainly in the cytoplasma of liver cells. Four distribution patterns of fluorescence-positive cells were observed: solitary, focal, disseminated, and lobular. The HBAg distribution patterns changed from solitary to lobular as liver disease progressed to more chronic and severe forms. No asymptomatic carriers or patients with acute hepatitis and chronic persistent hepatitis showed lobular distribution, whereas almost all patients with chronic aggressive hepatitis, liver cirrhosis, and primary hepatoma with cirrhosis had disseminated and lobular patterns. These facts suggest that HBAg plays an important role in the progress of liver disease.

8779 HEPATITIS B ANTIGEN AND PATHOLOGICAL CHANGES IN THE LIVER. *(E.)* Vesely, V.; Soustek, Z.; Kulich, V. (Univ. Hosp. Dept. Blood Transfusion, Plzen, Czechoslovakia). *J. Hyg. Epidemiol. Microbiol. Immunol.* 18(2):234-239, 1974.

Hepatitis B antigen (HBAg) was demonstrated with double immunodiffusion and immunoelectrophoresis in the sera of 6 out of 110 autopsies (36 females and 74 males, dying of various diseases at the age of 3 weeks to 85 yr). The 6 subjects positive for HBAg consisted of 3 men (ages 81, 36, and 50 yr) and 3 women (ages 85, 64, and 48 yr). Histological examinations of the liver were made for all cases. Each positive finding for HBAg was associated with pathological changes in the liver. Liver changes which could be related to healed hepatitis were found in 20.90% of the cases, though serological findings were negative for these. Negative morphological and serological findings were recorded in 73.65% of the autopsies. Moderate diffuse liver fibrosis with proliferation of the connective tissue in the periportal fields was found in 17 of the 104 negative cases. Postnecrotic cirrhosis of the liver without icterus was observed in 1 case. Three cases were icteric, and 2 cases showed cardiac liver cirrhosis. Examination for HBAg was negative in 1 case of cytomegalic hepatitis and in 1 case of hepatitis in a female who was operated on for cholelithiasis and necrosis of the head of the pancreas 1 month prior to death. It is suggested that a positive finding of HBAg indicates acute or suffered viral hepatitis; a negative finding does not exclude this and is of no importance in assessing the state of liver function or in determining the extent of liver damage.

8780 MANGANESE, COPPER, AND ZINC CONCENTRATIONS IN SERUM AND PACKED BLOOD CELLS DURING ACUTE HEPATITIS, CHRONIC HEPATITIS, AND POSTHEPATITIC CIRRHOSIS. *(E.)* Versieck, J.; Barbier, F.; Speecke, A.; Hoste, J. (Academic Hosp., Ghent, Belgium). *Clin. Chem.* 20(9):1141-1145, 1974.

Manganese, copper, and zinc concentrations in the sera and packed blood cells of 46 normal controls, patients with acute (20 cases) and chronic (persistent or agressive) hepatitis (8), and 5 cases of postnecrotic cirrhosis were determined with neutron-activition analysis. Increased serum manganese concentrations (2.32 ± 0.96 ng/ml mean) were always observed during the active phase of acute icteric viral hepatitis (10 patients); slight increases in mean serum copper (1.43 ± 0.36 μg/ml) were also observed. Serum manganese normalized during the subsiding phase, and serum zinc was normal in all 10 subsiding cases. Serum copper was increased to 2.32 μg/ml in 1 case of hepatitis B antigen positive hepatitis. All 3 metals remained at normal values in the 4 cases of chronic persistent hepatitis. Mean serum manganese (0.84 ± 0.24 ng/ml) was significantly higher than normal in chronic aggressive hepatitis (4 cases), while mean serum zinc (0.79 ± 0.20 μg/ml) was significantly decreased. Serum copper was normal. In postnecrotic cirrhosis, mean serum manganese (0.84 ± 0.20 ng/ml) was significantly increased, while copper and zinc concentrations were near normal. Serum zinc was definitely low, however, in 3 cases of advanced cirrhosis (0.62, 0.47, and 0.65 μg/ml, resp.). Manganese, copper, and zinc concentrations in packed blood cells did not show significant variations, with the exception of high manganese values (39.6 and 45.2 ng/g, resp.) found during the active and subsiding phase in a 36-yr-old woman with post-transfusion hepatitis. Positive correlations existed between serum manganese concentrations and serum bilirubin and serum aminotransferase activities in acute and chronic hepatitis and postnecrotic cirrhosis. There also was a highly significant positive correlation between serum aminotransferase activities and serum manganese concentrations.

8781 A CONTROLLED TRIAL OF STEROID THERAPY IN MASSIVE HEPATIC NECROSIS. *(E.)* Ware, A. J.; Jones, R. E.; Shorey, J. W.; Combes, B. (Univ. Texas Southwestern Med. Sch., Dallas). *Am. J. Gastroenterol.* 62(2):130-133, 1974.

An abbreviated, prospective, controlled trial of corticosteroid therapy (i.v. hydrocortisone followed by p.o. prednisolone) in 15 patients with massive hepatic necrosis associated with acute viral hepatitis is reported. Four of the 15 patients were randomly allocated to the steroid group while 11 were selected to receive placebo therapy. The 2 groups were not comparable in some clinical aspects; thus 3 of the 4 steroid-treated patients were more than 30 yr-old while only 2 of 11 placebo-treated patients were of this age. Differences with respect to sex, race and depth of coma at initiation of therapy were also present between the 2 groups. All patients were treated by a standard regimen. The 4 patients treated with corticosteroids all died while 7 of the 11 patients receiving placebo therapy recovered. These findings indicate that, with supportive care alone, a substantial number of patients will recover from this illness. Since the condition is relatively rare, definitive evaluation of the efficacy of steroid therapy in improving this survival rate will require evaluation by a number of centers in cooperation.

8782 VIRAL HEPATITIS: CURRENT CONCEPTS. *(Fr.)* Lapointe, G. (Hosp., Chicoutimi, Canada). *Union Med. Can.* 103(9):1573-1575, 1974.

8783 THE COVERT LIVER DISEASE OF DRUG ADDICTS. *(E.)* Ireton, J. H. C.; Gust, I. D.; Stening, G. F.; Smallwood, R. A. (Austin Hosp., Heidelberg, Australia). *Aust. NZ J. Med.* 4(3):304-305, 1974.

8784 ACUTE DEGENERATIVE HEPATITIS OF MICE PRODUCED BY FROG VIRUS 3: A NEW MODEL OF PATHOLOGY OF TRANSCRIPTION. *(E.)* Elharrar, M.; Gut, J. P.; Kirn, A. (INSERM Res. Group., Strasbourg, France). *Digestion* 10(3):218-219, 1974.

8785 CHANGES IN THE ACTIVITY OF SODIUM, POTASSIUM, AND CHLORIDE IONS IN SALIVARY SECRETION IN PATIENTS WITH VIRAL HEPATITIS. *(Rus.)* Sagradian, A. L. (Tbilisi Postgrad. Med. Inst., USSR). *Sobshch. Acad. Nauk Gruzinsk SSR* 75(2):489-492, 1974.

8786 PLASMA LIPID AND LIPOPROTEIN CHANGES IN ACUTE VIRAL HEPATITIS. *(E.)* Pearson, A. J. G.; Pyrovolakis, J.; McIntyre, N. (Roy. Free Hosp., London, England). *Eur. J. Clin. Invest.* 4(5):378, 1974.

8787 HEPATITIS AND AUSTRALIA ANTIGEN ANTIBODY STUDIES. *(E.)* Ashkar, F. S. (Univ. Miami Sch. Med., Fla.). *Lab. Med.* 5(11):30-36, 1974.

8788 LYMPHOCYTOTOXIC ANTIBODY IN ACUTE AND CHRONIC HEPATITIS AND ASYMPTOMATIC HEPATITIS B ANTIGEN CARRIERS. *(E.)* De Horatius, R. J.; Henderson, C.; Strickland, R. G. (Univ. New Mexico, Sch. Med., Albuquerque). *Clin. Res.* 22(4):602A, 1974.

8789 STUDY OF CELL-MEDIATED IMMUNITY TO AUSTRALIA ANTIGEN (AuAg) BY LEUKOCYTE MIGRATION INHIBITION, AFTER RECOVERY FROM HEPATITIS B AND IN HEALTHY CARRIERS OF THIS ANTIGEN. *(E.)* Frei, P. C.; Erard, P.; Perruisseau, G.; Glauser, M. P.; Libanska, J.; Wuilleret, B. (Cantonal Hosp., Lausanne, Switzerland). *Eur. J. Clin. Invest.* 4(5):364, 1974.

See also, 8435.

LIVER AND BILIARY TRACT

Chronic Hepatitis

8790 HISTOCOMPATIBILITY ANTIGENS IN ACTIVE CHRONIC HEPATITIS AND PRIMARY BILIARY CIRRHOSIS. *(E.)* Galbraith, R. M.; Eddleston, A. L. W. F.; Smith, M. G. M.; Williams, R.; McSween, R. N. M.; Watkinson, G.; Dick, H.; Kennedy, L. A.; Batchelor, J. R. (King's Coll. Hosp. Med. Sch., London, England). *Br. Med. J.* 3(5931):604-605, 1974.

Tissue typing with a standard lymphocytoxicity test and blood grouping were performed on 54 patients with active chronic hepatitis and 45 with primary biliary cirrhosis, all of whom were residents of the southeastern region of England. An additional group of 28 patients with primary biliary cirrhosis from the west of Scotland were also studied with a similar tissue typing method. The frequency of histocompatability antigens HL-A 1 (48%) and HL-A 8 (52%) in the 54 patients with active chronic hepatitis was significantly higher than in 89 control subjects from the same region (22% and 17%, resp.). No correlation was detected with the age and sex of the patients or with the presence of a particular immunological abnormality, but the frequency of HL-A 1 and HL-A 8 was much lower for 9 patients who were positive rather than negative for hepatitis-B-associated antigen. The importance of genetic factors in active chronic hepatitis is implied. In contrast, the frequency of HL-A 1 and HL-A 8 in the 45 patients with biliary cirrhosis from southeast England and the 28 patients with biliary cirrhosis from western Scotland was not significantly different from that found in control groups from the same region.

8791 HISTOLOGICAL CHANGES IN LIVER BIOPSIES FROM PATIENTS WITH CHRONIC HEPATITIS. *(E.)* Christoffersen, P.; Dietrichson, O. (Kommunehosp., Copenhagen, Denmark). *Acta Pathol. Microbiol. Scand. [A]* 82(4):539-546, 1974.

Sequential liver biopsies from 111 patients with verified chronic hepatitis were examined for incidence and degree of various histological qualities. The material was divided into 2 groups: 85 patients exhibiting changes as in chronic aggressive hepatitis and 26 patients with histological changes as in chronic persistent hepatitis. Chronic aggressive hepatitis was characterized by inflammatory infiltration of portal tracts and adjacent parenchyma and by necroses of hepatocytes in the limiting membrane (piece meal necrosis). In addition there were portal fibroses and some degree of bile duct proliferation. Approximately 1/3 of the biopsies with chronic aggressive hepatitis concurrently exhibited atypical bile duct epithelium. The inflammation in chronic persistent hepatitis, unlike that of chronic aggressive hepatitis was virtually confined to the portal tracts. The limiting plates were intact, and parenchymal cell damage was usually slight. The symptoms of chronic persistent hepatitis tended to be indefinite, and it was difficult to be sure whether this type of hepatitis represented a distinct disease process or merely a variant of the histological lesion of late viral hepatitis or chronic aggressive hepatitis. Transition from acute viral to chronic aggressive hepatitis may be suspected if the histological features of acute hepatitis are accompanied by a disproportionate degree of portal inflammation, extensive necrosis at the junctions between the portal tract and lobule, and portal fibrosis. Morphological findings indicate that the prognosis in chronic persistent hepatitis is excellent, whereas the prognosis in chronic aggressive hepatitis is poor, with cirrhosis often developing.

8792 SYPHILIS AND CHRONIC LIVER DISEASE. *(E.)* Harris, J. R. W.; McCann, V.J.; Mahony, J. D. H.; Kennedy, J.; Fulton, T. T. (Roy. Victoria Hosp., Belfast, Ireland). *Br. J. Vener. Dis.* 50(4):267-269, 1974.

Serum samples from 49 patients (19 male and 30 female) with chronic hepatic disease were investigated for evidence of syphilitic infection. Wassermann reactions, Kahn Reiter protein complement-fixations, and fluorescent treponemal antigen absorption (FTA-ABS) tests were performed on the samples. Homogeneous positive FTA-ABS results were obtained for 6 of the patients, and 3 of these 6 were also positive for the Wassermann reaction and the protein complement fixation. Two of the 6 with positive FTA-ABS tests but no other evidence of syphilis were probably false positive. Only 1 of the remaining 4 patients who definitely had syphilis was aware of the diagnosis. None of the 4 had any characteristic clinical signs indicating such infection. Patients diagnosed as having definite syphilis were thought to have either cryptogenic or alcoholic cirrhosis. All of the patients with both syphilis and cirrhosis were male.

8793 THE INCIDENCE OF OXYPHENISATIN-INDUCED LIVER DAMAGE IN CHRONIC NON-ALCOHOLIC LIVER DISEASE. A CONTROLLED INVESTIGATION. *(E.)* Dietrichson, O.; Juhl, E.; Nielsen, J. O.; Oxlund, J.J.; Christoffersen, P. (Kommunehosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(5):473-478, 1974.

Oxyphenisatin acetate provocation (5 mg p.o. twice daily for a maximum of 7 days) was performed with a double-blind cross-over technique in 32 patients (26 females and 6 males, aged 19-84 yr) with chronic non-alcoholic liver disease. The patients were investigated on the 3rd and 7th day of the provocation plus 7 and 14 days after the end of the series. An increase of more than 3 times (200%) the starting values of serum aspartate transaminase or serum bilirubin was considered a significant reaction and cause for immediate discontinuance of the drug. Ten of the patients showed a positive reaction to the drug, with 4 showing more than 200% increases in both serum aspartate transaminase and serum bilirubin on day 3 or day 7 of the provocation. The remaining 6 positives showed more than 200% increase in either one or the other of the 2 serum components measured. Serum values for the transaminase and bilirubin rapidly returned to normal with discontinuation of the provocation. Pain under the right costal margin was experienced by 6 of the patients during the tests. Patients with a positive reaction were those with a long history of high oxyphenisatin intake and those with a long history of active liver disease. Serum bilirubin values prior to provocation were higher in the negative patients. Positive lupus erythematosus cell tests were demonstrated more frequently in the positive-reacting patients (50%) than in the negative group (5%). The results indicate that the use of oxyphenisatin-acetate, a long standing laxative in Denmark, is not justified.

See also, 8780, 8788.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

8794 DEATHS AMONG YOUNG ALCOHOLICS IN THE U.S. NAVAL SERVICE. *(E.)* Schuckit, M. A.; Gunderson, E. K. E. (Navy Med. Neuropsych. Res. Unit, San Diego, Calif.). *Q. J. Stud. Alcohol* 35(3):856-862, 1974.

Demographic characteristics and cause of death are reported for separate samples of all Navy and Marine enlisted men hospitalized for alcoholism between July 1965 and December 1971. The death rate of alcoholics in both services was 15/1000/yr, with the deceased being older and more senior in rank than the average enlisted sailor or Marine. Slightly more than 1/2 of each sample died in the hospital. The percentage of deaths due to liver cirrhosis and pancreatitis among Navy alcoholics was 11 times that of the entire enlisted population (11% *versus* 1%). Liver cirrhosis and pancreatitis accounted for 19% of the deaths among Marine alcoholics as compared to a 1% figure for the entire Marine service. Ulcers accounted for 17% of the deaths among Navy alcoholics and 6% of the deaths among Marine alcoholics (percentage for the entire service in each case was 1).

8795 ALCOHOL AND LIVER DISEASES (REVIEW). *(Rus.)* Skupnik, A. M.; Mikunis, R. I. (no affil.). *Ter. Arkh.* 46(4):21-31, 1974.

See also, 8749.

LIVER AND BILIARY TRACT

Cirrhosis

8796 PRIMARY BILIARY CIRRHOSIS IN SYSTEMIC SCLEROSIS (SCLERODERMA) AND POLYMYOSITIS. *(E.)* Uhl, G. S.; Baldwin, J. L.; Arnett, F. C. (Wilford Hall USAF Med. Ctr, San Antonio, Tex.). *Johns Hopkins Med. J.* 135(3):191-198, 1974.

A case of primary biliary cirrhosis occurring in systemic sclerosis with concomitant polymyositis is reported. The patient was a 48-yr old white woman with long-standing systemic sclerosis (scleroderma) who presented with fatigue, muscle weakness, and abnormal liver and muscle function tests. Hepatic biopsy and the presence of mitochondrial antibodies confirmed the diagnosis of primary biliary cirrhosis. Polymyositis was demonstrated by muscle biopsy. Laboratory findings were: alkaline phosphatase 108 mU/ml, SGOT 195 mU/ml, total bilirubin 0.8 mg%, bromsulfalein retention 13% at 45 min, cholesterol 295 mg%, triglycerides

75 mg%, 5'-nucleotidase 3.4 U, γ-glutamyl transpeptidase 204 U, and hepatitis-associated antigen negative. Total serum protein was 8.7 g% with 4.4 g% globulin; protein electrophoresis showed increased α-2, β, and γ fractions. Quantitative immunoglobulins revealed a very high immunoglobulin M value of 790 mg% (normal 40-180). Serum was trace positive for cryoglobulins. Antimitochondrial antibodies were strongly positive. Creatine phosphokinase was 96 mU/ml (normal 5-30), and electromyograms revealed spontaneous fibrillation and positive sawtooth potentials occurring in short repetitive salvos. The patient was treated with 40 mg of prednisolone on alternate days for the polymyositis. Muscle strength was normal at 16 weeks and creatine phosphokinase was normalized at 25 mU/ml; however, alkaline phosphatase, SGOT, and LDH remained elevated, suggesting ongoing liver disease.

8797 WIDESPREAD ATYPICAL LICHEN AMYLOIDOSUS, PRIMARY BILIARY CIRRHOSIS AND SCLERODERMA.

(E.) Black, M. M. (St. John's Hosp. Dis. Skin, London, England). *Br. J. Dermatol.* 91(Suppl. 10):42-45, 1974.

A case of widespread lichen amyloidosis combined with primary biliary cirrhosis and scleroderma is described. The patient was a 45 yr old female with a history of progressively spreading pruritic papular eruptions. Examination revealed numerous small flat-topped shiny papules in both cubital fossae; these were also present on the flexor aspect of the lower forearms and extensor aspect of the lower legs. Spreading of the eruption to the thighs, dorsa of the feet, hands, and fingers, and soles of the feet was observed at a subsequent examination. Diffuse macular hyperpigmentation of the trunk, limbs, head, and neck was also displayed. Liver biopsy revealed extensive fibrosis and some nodule formation. Bile duct proliferation and moderate acute and chronic inflammatory infiltrate were also noted. Laboratory findings were: hemoglobin 13.8 g, erythrocyte sedimentation rate 75 mm/1 hr, serum bilirubin 1.0 mg/100 ml, serum alkaline phosphatase 85.0 KA U/100 ml, thymol flocculation + + +, serum proteins 8.8 g/100 ml, and a slight increase in $\alpha 2$ and a general increase in γ-globulin. Smooth muscle antibody and anti-nuclear factor were negative, while mitochondrial antibody was positive (greater than 1 in 40). Immunoglobulin G was 2340 mg/100 ml, immunoglobulin A 405 mg/100 ml, and immunoglobulin M 560 mg/100 ml. The patient is believed to be the first reported case of lichen amyloidosus associated with the development of the Kobner phenomenon.

8798 MACROCYTOSIS IN LIVER CIRRHOSIS AND ITS NORMALIZATION DURING THERAPY. *(Ger.)*

Becker, H.; Mosawi, N. (Munic. Hosp., Frankfurt, Germany). *Verh. Dtsch. Ges. Inn. Med.* 79th Congress, 470-473, 1973.

Macrocytosis was studied in 72 cases of histologically confirmed cirrhosis without hemolytic syndrome and iron deficiency in an attempt to discover a pathogenetic relation between cirrhosis and macrocytosis. Macrocytes with cell volume values over $90 \pm 7\ \mu^3$ were considered for the study; the values averaged $103.4 \pm 20.3\ \mu^3$. The macrocyte volume was within the normal range in 26 patients, over 100 μ^3 in 46 cases, over 100 μ^3 in 13 cases, and over 120 μ^3 in 4 cases. The macrocyte cell volume (MCV) values were above average in alcoholics ($112.5 \pm 20\ \mu^3$). There was no significant difference between the degree of anemia in the groups with the lowest and highest MCV values. The hemoglobin level averaged 11.8 g/100 ml in macrocytoses *versus* 12.8 g/100 ml in normocytoses. Because the degree of macrocytosis was not related to the degree of the anemia, it is concluded that pronounced macrocytosis can occur without anemia. Therapy (rest, diet, vitamin B_{12} and folic acid) resulted in a decrease of the MCV value in all 20 macrocytic cases, and values below 100 μ^3 were reached in 7 cases. The hemoglobin level either showed no change or decreased, and increase of the hemoglobin and erythrocyte levels was also observed, indicating the absence of any causal relationship between cirrhosis and anemia. The findings did not reveal the cause of macrocytosis in cirrhosis, but indicate that this condition occurs more frequently than has previously been recognized.

8799 THE INFLUENCE OF PORTOSYSTEMIC SHUNT OPERATION ON IMMUNOGLOBULINS AND Escherichia coli ANTIBODIES IN PATIENTS WITH CIRRHOSIS OF THE LIVER.

(E.) Prytz, H.; Bjorneboe, M.; Johansen, T. S.; Orskov, F. (Bispebjerg Hosp., Copenhagen, Denmark). *Acta Med. Scand.* 196(1/2):109-112, 1974.

Serum γ-globulin levels were determined by paper electrophoresis in 54 patients (27 men and 27 women, mean age 56 yr) with cirrhosis of the liver before and after establishment of a portacaval shunt. A control group of 23 patients operated on for cancer of the lung was studied similarly. A postoperative increase in serum γ-globulin from 18.6 g/liter (prior to shunt operation) to 23.0 g/liter at 7–9 weeks after the operation was observed in the cirrhotics as compared to a mean increase from 12.6 to 13.3 g/liter for controls. Mean albumin values for the cirrhotics decreased from 6.0 g/liter to 5.8 g/liter. Serum immunoglobulins and antibodies to the *Escherichia coli* O group antigens were studied in 2 other groups of patients. One group consisted of 31 patients with cirrhosis and a portacaval shunt, and the other group consisted of 128 cirrhotics without shunt. Average immunoglobulin G and immunoglobulin A values for the patients with portacaval shunts were 24.1 and 5.2, resp., as compared to 19.0 and 4.6 for non-shunt patients. The number of positive antibody reactions in shunt patients was also higher (4.6 mean) in comparison to non-shunt patients (3.3 mean). The γ-globulin increase observed in the first study appears to be related to the change in liver circulation established by the portacaval shunt. The second study supports the conclusion from the first study: the observed changes in immunoglobulins and antibodies are expected if the cirrhotic liver has retained some of the ability of the normal liver to inhibit immunogens.

8800 MATERIAL ISOLATED FROM NORMAL AND VARIANT HUMAN LIVER THAT IMMUNOLOGICALLY CROSS-REACTS WITH ALPHA$_1$-ANTITRYPSIN. *(E.)*

Matsubara, S.; Yoshida, A.; Lieberman, J. (City Hope Natl. Med. Ctr., Duarte, Calif.). *Proc. Natl. Acad. Sci. USA* 71(9):3334-3337, 1974.

A material that strongly reacts with antibodies against α_1-antitrypsin, but has little trypsin inhibitory capacity, was isolated and purified to homogeneity from human liver. Chemically the cross-reacting material is a single chain glycoprotein with a molecular weight of about 18,000, which is significantly lower than that of serum α_1-antitrypsin. The material isolated from the liver of a homozygous variant subject (ZZ) with α_1-antitrypsin deficiency was readily distinguished by electrophoresis from the material extracted from a normal (MM) subject. The tissues from a heterozygous variant subject (MZ) contained both components. The immunologically cross-reacting material is presumably synthesized by the gene that codes for α_1-antitrypsin. The exact biological and structural relations between the cross-reacting material and α_1-antitrypsin are not clear. The material may be part of a precursor for α_1-antitrypsin and, after activation and completion of the molecule, be released from tissues into sera. Alternatively, α_1-antitrypsin may be trapped in tissues after partial degradation and inactivation, resulting in the accumulation of the cross-reacting material in the liver.

8801 HEPATIC NEUROPATHY: A CLINICAL AND ELECTROPHYSIOLOGICAL STUDY. *(E.)* Kardel, T.; Nielsen, V. K. (Gentofte Hosp., Copenhagen, Denmark). *Acta Neurol. Scand.* 50(4):513-526, 1974.

Peripheral nerve function was affected in 31 out of 34 patients (16 female, 18 male, mean age 54 yr) with biopsy-verified liver cirrhosis. Twenty patients had a surgical portacaval shunt. Eighteen patients had a history of chronic alcoholism. Liver biopsies showed a primary biliary cirrhosis in 2 patients. An elevated vibratory perception threshold (VPT) on the big toe was the most common sign of peripheral nerve dysfunction. Nerve function in the arm was also impaired. During ischemia, the rise in VPT (index finger) was delayed in 18 patients. An equivalent slowing of the sensory nerve conduction velocity was recorded in the digit-wrist and wrist-elbow segments of the median nerve, accompanied by a reduction in amplitude and an increase in temporal dispersion of the action potentials. The sensory threshold for electrical stimuli (digit 3) was significantly raised. There was no relationship between neurological findings and routine liver function tests or galactose elimination capacity. Neurological findings occurred with the same frequency in patients with and without chronic alcoholism and in patients with and without a diabetic glucose tolerance test. The distribution of the findings suggests that hepatic neuropathy results from a metabolic inhibition of the nerve axon membrane function.

8802 TREATMENT OF CHRONIC HEPATIC ENCEPHALOPATHY WITH LEVODOPA. *(E.)* Lunzer, M.; James, I. M.; Weinman, J.; Sherlock, S. (Roy. Free Hosp., London, England). *Gut* 15(7):555-561, 1974.

Therapeutic trials with levodopa were conducted on 6 patients (4 males and 2 females, 41-70 yr old) with chronic hepatic encephalopathy with a diagnosis of cryptogenic cirrhosis. All patients had abnormal electroencephalograms and showed clinical evidence of severe neurological impairment. Additionally, they demonstrated a poor response to a low-protein diet, lactulose or neomycin, and colonic exclusion in 2 cases. Three of the patients had previous portacaval anastomoses, while the remaining 3 had natural portal-systemic shunts. Trials were conducted on a double-blind crossover basis after 12 weeks maintenance on levodopa (mean daily dose of 2.1 g/day). Patients were assessed by physical examination, serial electroencephalography, computerized psychometric testing, and measurements of cerebral metabolism and hemodynamics. Definite clinical improvement was noted in 3 of the 6 patients. Gait improved and tremor lessened in 3 patients on levodopa, and coordination improved to a lesser extent in 2 patients. The beneficial effect was not restricted to extrapyramidal functions. Speech was improved in 2 patients, and mood was improved in 3. Only 1 patient was able to tolerate the drug sufficiently long for double-blind assessment. This patient showed marked deterioration when changed to placebo and improvement when recommenced on levodopa. Serial electroencephalography did not demonstrate significant changes in any of the patients, though a significant rise in cerebral oxygen consumption was observed during levodopa therapy. A therapeutic trial of levodopa in patients with chronic hepatic encephalopathy appears indicated when response to conventional therapy is poor.

8803 SERUM ALBUMIN TURNOVER IN LIVER CIRRHOSIS. *(E.)* Bianchi, R.; Mariani, G.; Pilo, A.; Toni, M. G. (2nd Med. Clin., Univ. Pisa, Italy). *J. Nucl. Biol. Med.* 18(1):20-29, 1974.

Albumin catabolism, distribution, and synthesis was observed for 7-23 days in 19 cirrhotic patients, divided into ascitic and nonascitic groups, injected with ^{131}I-human serum albumin (2 μC/kg i.v.). Venous blood samples were obtained 10 min after injection, then at intervals of 1-48 hr, and finally once a day until the end of the experiment. Serum albumin concentration was reduced in both groups but was significantly lower in patients with ascites than in patients without ascites. Intravascular albumin mass was at the lower limit of normal in both groups; the equal size of the intravascular pool in the 2 groups despite the lower serum albumin concentration in patients with ascites was due to the enlarged plasma volume in the latter group. Although extravascular albumin mass was markedly reduced in both groups, it was significantly lower in the ascites group, indicating a marked depletion of intracellular albumin stores. Both fractional and absolute catabolic rates were slightly lower in the patients with ascites. Synthesis rates, determined in 3 patients injected simultaneously with ^{131}I-human serum albumin and sodium ^{14}C-carbonate (150 μC) and 3 days later with ^{14}C-urea (50 μC), were in close agreement with catabolic rates. Liver function tests showed significant correlations between plasma prothrombin content and the absolute catabolic rate of albumin, and between SGOT and the ratio between extravascular and intravascular pool.

8804 THE EFFECT OF CIRRHOSIS ON THE DISPOSITION AND ELIMINATION OF MEPERIDINE IN MAN. *(E.)*

Klotz, U.; McHorse, T. S.; Wilkinson, G. R.; Schenker, S. (Vanderbilt Univ. Sch. Med., Nashville, Tenn.). *Clin. Pharmacol. Ther.* 16(4):667-675, 1974.

The disposition and elimination of meperidine were compared in drug- and alcohol-free, age-matched groups of 8 normal volunteers (mean age 43 yr) and 10 patients (mean age 46 yr) with liver cirrhosis. The urine was kept at pH 7.0 or more by p.o. administration of 1.8 g of sodium bicarbonate (3 doses, 1 every 2 hr) on the evening prior to the study and every 2 hr during the blood collection period to minimize intersubject variation from variable pH-dependent urinary excretion of meperidine and its pharmacologically-active metabolite normeperidine. Meperidine and normeperidine concentrations in the plasma and urine were determined by gas chromatography, and meperidine plasma concentrations were fitted by an exponential time function. A single rapid i.v. injection of meperidine (0.8 mg/kg) was followed by a biexponential decline of plasma meperidine concentration in normals; the fast and slow disposition rate constants had half-lives of 0.19 hr and 3.2 hr (mean values), resp., in the normal group. The half-life corresponding to the fast disposition rate contant was unchanged in the cirrhotics, but the slow disposition rate constant half-life increased to 7.0 hr. This was associated with a reduction in the total plasma meperidine clearance from 1316 ml/min to 664 ml/min. Data analysis with a 2 compartment open model indicated that meperidine was extensively distributed; initial distribution volume was 1.54 liters/kg, and steady-state volume of distribution was 4.17 liters/kg in controls. Similar distribution volumes were noted in cirrhotics. The overall 1st-order rate elimination rate constant decreased from 6.72 X 10^{-1} /hr in normals to 2.42 X 10^{-1}/hr in cirrhotics. The plasma binding (64.3%) and blood/plasma concentration ratio (6.83 X 10^{-1}) did not differ between normals and cirrhotics. No correlations appeared between the slow disposition rate constant half-life or plasma clearance in cirrhotics and the usual biochemical hepatic function tests. Normeperidine was not detected in the plasma of either group. The elimination of meperidine appears to be prolonged in cirrhosis, probably due to impairment of the liver's drug-metabolizing activity. Caution should be exercised in administering the drug to cirrhotics.

8805 ALTERATIONS IN CIRCULATING THYROID HORMONES AND THYROTROPIN IN HEPATIC CIRRHOSIS: EVIDENCE FOR EUTHYROIDISM DESPITE SUBNORMAL SERUM TRIIODOTHYRONINE. *(E.)*

Chopra, I. J.; Solomon, D. H.; Chopra, U.; Young, R. T.; Chua Teco, G. N. (Univ. Calif. Ctr. Hlth. Sci., Los Angeles). *J. Clin. Endocrinol. Metab.* 39(3):501-511, 1974.

Serum concentrations of thyroid hormones and thyrotropin were studied with radioimmunoassay in 23 clinically euthyroid patients with hepatic cirrhosis (mean age 48 yr). The mean serum total thyroxine concentration was 7.5 μg/100 ml as compared with a normal value 8.4 μg/100 ml. Since the dialyzable fraction of serum thyroxine in the patients was considerably above normal (0.055% *versus* 0.030%), their mean serum free thyroxine concentration of 3.9 ng/100 ml was significantly greater than the mean normal value of 2.8 ng/100 ml. The mean serum concentration of triiodothyronine was 33 ng/100 ml in the patients as compared to a normal mean of 126 ng/100 ml. The mean serum concentration of free triiodothyronine was 163 pg/100 ml as compared to a normal value of 375 pg/100 ml. The mean serum concentration of thyrotropin in the cirrhotic patients was 8.0 μU/ml as compared to a 4.6 μU/ml in normals; it did not differ significantly from that found in newborns (cord serum). The clinical impression of euthyroidism was strengthened by normal serum thyrotropin responses to i.v. administration of thyrotropin-releasing hormone (200 μg) in 5 of 6 patients. Normal Achilles reflex time and an index of myocardial contractility assessed by sphygomorecording also supported the clinical diagnosis of euthyroidism. High normal or high serum free thyroxine concentrations appeared to maintain the euthyroidism in the patients since serum free triiodothyronine concentrations were in the hypothyroid range. Elevated serum free thyroxine was considered a result of a compensatory increase in the activity of pituitary-thyroid axis in response to the low serum free triiodothyronine. Thyroidal secretion of triiodothyronine assessed with a study of serum triiodothyronine responses to thyrotropin-releasing hormone (200 μg i.v.) indicated that thyroid reserve is well maintained in cirrhosis patients. The low serum free triiodothyronine in these patients is probably a result of a substantial reduction in extrathyroidal conversion of thyroxine to triiodothyronine in hepatic cirrhosis.

8806 ACTIVITIES OF KREBS-HENSELEIT ENZYMES IN NORMAL AND CIRRHOTIC HUMAN LIVER. *(E.)*

Khatra, B. S.; Smith, III, R. B.; Millikan, W. J.; Sewell, C. W.; Warren, W. D.; Rudman, D. (Emory Univ. Sch. Med., Atlanta, Ga.). *J. Lab. Clin. Med.* 84(5): 708-715, 1974.

Activities of 5 Krebs-Henseleit (KH) enzymes (carbamyl phosphate synthetase, ornithine transcarbamylase, argininosuccinic acid synthetase, argininosuccinic acid lyase, and arginase) were determined in liver tissue obtained at laparotomy from 17 patients with alcoholic cirrhosis and from 19 persons without liver disease. Specific activities of the 5 enzymes were calculated on the basis of 4 units of reference: wet weight, total N, noncollagen N, and DNA. Specific activities of all 5 enzymes were depressed in cirrhotic liver. The degree of reduction was similar regardless of the unit of reference used to calculate specific activity. Average depression below normal for activity/mg DNA was carbamyl phosphate synthetase, 54%; ornithine transcarbamylase, 37%; argininosuccinic acid synthetase, 50%; argininosuccinic acid lyase, 64%; and arginase, 69%. Rate-limiting enzymes for operation of the KH cycle were carbamyl phosphate synthetase, argininosuccinic acid synthetase, and argininosuccinic acid lyase in both normal and cirrhotic livers. The extent of loss of these 3 enzymes in cirrhotic liver measured *in vitro* correlated with reduction in the maximal rate of urea synthesis and severity of NH_4Cl intolerance measured *in vivo*.

8807 ACUTE BLEEDING INTO THE PLEURAL AND ABDOMINAL CAVITIES IN PATIENTS WITH CIRRHOSIS. *(Rus.)* Krylov, A. A. (S. M. Kirov Mil. Med. Acad., Leningrad, USSR). *Ter. Arkh.* 46(4):79-81, 1974.

8808 SERUM VITAMIN B_{12} AND B_{12} BINDING CAPACITY IN INDIAN CHILDHOOD CIRRHOSIS: A PRELIMINARY REPORT. *(E.)* Saraya, A. K.; Chopra, S. K.; Chandra, R. K. (All-India Inst. Med. Sci., New Delhi). *Indian J. Med. Res.* 62(6):909-913, 1974.

8809 THE DAILY RHYTHM OF CORTISOLEMIA IN HEPATIC CIRRHOSIS. *(E.)* Ruzyllo, E.; Dzieniszewski, J.; Milewski, B.; Krygier, T. (Med. Ctr. Postgrad. Education, Warsaw, Poland). *Materia Med. Polonica* 5(1):9-16, 1974.

8810 SURGICAL TREATMENT OF PORTAL HYPERTENSION. *(E.)* Zannini, G.; Bracale, G. C.; Jovino, R.; Masciariello, S. (Fac. Med., Univ. Naples, Italy). *Rend. Gastroenterol.* 5(3):226, 1973.

See also, 8381, 8475, 8780, 8790, 8792, 8793.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

8811 CELLULAR SITES OF IMMUNOGLOBULINS. V. AN IMMUNOLOGICAL STUDY OF THE HUMAN GALL BLADDER. *(E.)* Chen, S. T.; Tobe, T. (Fac. Med., Kyoto Univ., Japan). *Digestion* 10(3):184-190, 1974.

Gallbladder tissue and bile were obtained during cholecystectomy from 6 male and 9 female patients (27-51 yr old) for radial immunodiffusion studies of immunoglobulins in gallbladder bile and immunofluorescence studies of the distribution of immunoglobulin-containing cells in gallbladder mucosa. All of the patients had cholelithiasis with mild to severe cholecystitis; none had paraproteinemia or blood diseases. Immunoglobulin-containing cells were found to be considerably less numerous in the bile than in the alimentary tract, although immunoglobulin A-containing cells greatly exceeded immunoglobulin M- and immunoglobulin G-containing cells as in the gut. The total number of immunocytes in the gallbladder mucosa was not correlated with the severity of cholecystitis, except for moderately increased numbers of immunoglobulin M-containing cells in empyematous gallbladders. There were, however, increased numbers of immunoglobulin G- and immunoglobulin M-containing cells in muscle layers of severely inflamed gallbladders. Immunoglobulin levels in bile were highly variable and often bore no quantitative relationship to the number of gallbladder immunocytes in contrast to previous intestinal tract findings. Biliary immunoglobulin concentrations appear to be influenced by multiple factors such as variable contributions from the liver, transudation or absorption across inflamed mucosa, and local synthesis and secretion by the gallbladder.

8812 STONES IN COMMON BILE DUCT: NON-OPERATIVE MANAGEMENT. *(E.)* Mok, H. Y. I.; Bell, G. D.; Whitney, B.; Dowling, R. H. (Roy. Postgrad. Med. Sch., London, England). *Proc. R. Soc. Med.* 67(7):658-660, 1974.

The non-operative management of stones in the common bile duct with cholic acid infusion therapy is reported. The patient was a 62-yr-old male who had undergone cholecystostomy with removal of multiple small gall stones and subsequent cholecystectomy. On the latter occasion a stone was also removed from the common bile duct which was dilated. A subsequent T-tube cholangiogram showed another stone in the common hepatic duct. The patient was re-admitted for common bile duct stone dissolution therapy. Treatments with saline infusion (500 ml 0.9% sodium chloride/12 hr) for 1 week and heparin infusion (50,000 U in 500 ml saline/12 hr) for 1 week were unsuccessful. Treatment with cholic acid infusion (100 mM solution, 30 ml/hr) plus cholestyramine (4 g/2 hr p.o.) to control diarrhea, resulted in an attack of severe upper abdominal pain and vomiting after 2 days. A T-tube cholangiogram 5 days later showed a normal common bile duct with disappearance of the stone. A subsequent cholangiogram 1 week later was also normal. Follow-ups 1 and 3 months later indicated good physical condition and normal liver function tests. Cholic acid infusion therapy was also used to treat 3 other patients with retained common bile duct stones. The treatment was successful in 1 of the 3 patients.

8813 DISSOLUTION OF GALLSTONES WITH BILE SALTS, LECITHIN, AND HEPARIN. *(E.)* Cheung, L. Y.; Englert, Jr., E.; Moody, F. G.; Wales, E. E. (Univ. Utah Med. Ctr., Salt Lake City). *Surgery* 76(3):500-503, 1974.

In vitro experiments were performed to evaluate the solubility of human cholesterol gallstones in various bile salt solutions (physiological concentration) with and without the addition of lecithin and heparin. Gallstones were collected during surgery with a sterile technique and placed in the patient's own bile. Gallstones of similar size and weight obtained from the same patient were placed in 10 ml of 150 mM sodium phosphate buffer solution (pH 8) containing one of the salts (100 mM) with and without lecithin and heparin for incubation at 37 C. Unconjugated deoxycholate (100 mM) with lecithin solution (100 mM) was the most effective solution for dissolving human cholesterol gallstones. The addition of heparin at a concentration of 1000 U/10 ml did not increase the solubilizing capacity of deoxycholate. Optimal dissolution of gallstones required renewal of the solutions. Unconjugated deoxycholate with lecithin appears to be potentially useful as an effective infusate for retained bile duct stones; its toxicity by T-tube infusion at this concentration, however, is unknown and warrants further study.

8814 SUPERSATURATED BILE — IS IT DUE TO A METABOLIC DISORDER OR TO AN IMPAIRED GALLBLADDER? *(E.)* Schersten, T.; Cahlin, E.; Jonsson, J.; Lindblad, L.; Nilsson, S. (Sahlgrenska Hosp., Univ. Goteborg, Sweden). *Scand. J. Gastroenterol.* 9(5): 501-506, 1974.

Biliary lipid composition during various bile acid secretion rates was determined in 15 patients (9 women, median age of 43 yr; 6 men, median age of 56 yr) operated on for uncomplicated gallstone disease. Bile acid secretion rate was varied by enterohepatic circulation interruption with a balloon catheter and by duodenal refeeding of bile acid conjugates in Ringer's solution. The hepatic bile varied from being unsaturated or saturated to being supersaturated with cholesterol, at bile acid secretion rates of 1300 ± 300 μM/hr. The diurnal variation of biliary lipid composition was studied in another 10 cholecystectomized patients. Night bile from fasting patients was supersaturated with cholesterol. Lipid composition and diurnal variation were similar in 7 of the patients. These patients secreted supersaturated bile for a mean of 13 hr out of the 24; 2 patients secreted supersaturated bile throughout the 24 hr. A low bile acid secretion rate appears capable of causing supersaturation of hepatic bile with cholesterol. Also, a functioning gallbladder does not appear essential for continuous production and secretion of supersaturated bile.

8815 CANALICULAR BILE SECRETION IN MAN. STUDIES UTILIZING THE BILIARY CLEARANCE OF $[^{14}C]$ MANNITOL. *(E.)* Boyer, J. L.; Bloomer, J. R. (Yale Univ. Sch. Med., New Haven, Conn.). *J. Clin. Invest.* 54(4):773-781, 1974.

Bolus injections of 50 μC of sterile ^{14}C-mannitol were administered i.v. (in 250 mg of unlabeled mannitol) to 5 postcholecystectomy patients (3 women and 2 men, 20-71 yr old) with indwelling T-tubes and reestablished enterohepatic circulations to evaluate the biliary clearance of labeled mannitol as an indicator of canalicular bile flow. Labeled mannitol appeared in collections of bile 9 to 22.5 min after i.v. injection, rose to a peak, and thereafter paralled the plasma ^{14}C-mannitol disappearance curve. Bile-plasma labeled mannitol ratios and labeled mannitol clearances were determined during control and choleretic periods after correction of the bile ^{14}C-mannitol points for the transit time of a given sample. Injection of sodium dehydrocholate (5 ml i.v.) resulted in proportionate increases in bile flow and mannitol clearance. However, when ductular secretion was stimulated with i.v. bolus of secretin (75-90 U) in other studies, labeled mannitol clearance remained essentially unchanged, indicating that ^{14}C-mannitol entered bile at the level of the hepatocyte and could be utilized as a marker of canalicular flow in man. During control studies when bile drained spontaneously from biliary fistulas in fasting patients, bile plasma ^{14}C-mannitol ratios averaged 0.62 ± 0.12 ml/min. When the rate of bile flow was plotted as a function of bile salt excretion after correction for the effects of biliary dead space, linear regression analysis revealed that approximately 7 μliter of bile was secreted with each μM of bile salt. Estimates of bile salt-independent canalicular flow accounted for at least 1/3 of the estimated 24-hr bile production (604 ml) in these patients, indicating that this fraction of canalicular flow is a significant source of bile secretion in man.

8816 BILE DUCT PRESSURE AND CARDIAC SYMPTOMS. *(E.)* Geisler, F.; Dona, G.; Shapira, J.; Gutman, A. (Donolo Gov. Hosp., Jaffa, Israel). *Israel J. Med. Sci.* 10(6):677-679, 1974.

The effect of varying bile duct pressure on cardiac functions was studied in 12 unanesthetized patients (10 female and 2 male, average age 47 yr) who had undergone cholecystectomy and T-tube drainage 15-20 days earlier. The pressure in the common bile duct was increased through a T-tube with an insufflation apparatus, and an electrocardiogram was recorded simultaneously. Blood pressure and pulse were also monitored continuously. No changes in any of the cardiac parameters were observed during the bile duct pressure increases. The patients complained of some discomfort in the bile duct area, though immediate relief was experienced with pressure decrease. No discomfort or complications occurred following the examination. Although cholelithiasis and cholecystitis are frequently reported to be associated with cardiac symptoms, the present findings indicate no association between an increase in bile duct pressure and cardiac symptoms.

8817 DYNAMICS OF THE ENTEROHEPATIC CIRCULATION OF BILE ACIDS. POSTPRANDIAL SERUM CONCENTRATIONS OF CONJUGATES OF CHOLIC ACID IN HEALTH, CHOLECYSTECTOMIZED PATIENTS, AND PATIENTS WITH BILE ACID MALABSORPTION. *(E.)* LaRusso, N. F.; Korman, M. G.; Hoffman, N. E.; Hofmann, A. F. (Mayo Clin., Rochester, Minn.). *N. Engl. J. Med.* 291(14):689-692, 1974.

The effect of 3 liquid meals (corn oil, dextrose, and 300 ml Meritene) on the serum level of cholic acid conjugates was determined with radioimmunoassay in 8 healthy subjects, 5 cholecystectomized patients, and 6 patients with bile acid malabsorption. In the 1st group (6 men and 2 women, mean age 36.4 yr), the bile acids peaked 90-120 min after each meal and returned to baseline by 4 hr. Maximal postprandial increases for each patient were large (200-1000% increase above baseline). The pattern was meal related as indicated by the fact that bile acid values remained at [illegible] ine in 4 subjects undergoing a 22-hr fast. In [illegible] and 4 women, mean age 55.4 yr) cholic acid conjugates increased to lower maxima after the 1st meal and then remained elevated throughout the day, returning to base line 14 hr after the evening meal. Cholic acid conjugate serum concentrations increased to a maximum at 75-105 min after the initial test meal. After the initial meal, the maximum for each patient was small (100-400% increase above base line) as compared to healthy subjects. In the 3rd group (1 man and 5 women with ileal resection, mean age 42.5 yr), the postprandial maxima were small (50-250% above base line) in comparison to the healthy subjects. The time between the ingestion of the initial test meal and maximal postprandial increase was significantly shorter (75 min in 2 patients and 90 min in 4 patients). There was no correlation between the length of ileum resected or amount of steatorrhea and the fasting or postprandial levels of cholic acid con[illegible]s. The observations indicate that serum cholic acid conjugate determinations can be used to investigate the dynamics of the enterohepatic circulation of bile acids. The determination of postprandial levels [illegible] acid conjugates may prove to be a simple, [illegible] and valid test of bile acid malabsorption.

SPHINCTEROPLASTY FOR POSTCHOLECYSTECTOMY SYNDROME.

(E.) Taft, D. A.; Wreggit, G. R. [illegible] nia Mason Med. Ctr., Seattle, Wash.). *Am. Surg.* [illegible] 527-530, 1974.

Criteria for diagnosing stenosis of the sphincter of Oddi in cholecystectomy patients were reviewed based on statistics from 12 patients undergoing transduodenal sphincteroplasty for the condition. A normal or [illegible] htly dilated common duct was noted in this [illegible] patients and was not amenable to choledoch[illegible]nostomy. Extensive sphincteroplasty, implying [illegible] ete division of the sphincter mechanism, was used. Criteria to be met before diagnosis of stenosis of the sphincter of Oddi is considered and sphincteroplasty undertaken include: a history suggestive of postcho[illegible]my syndrome; and elevated levels of alkaline phosphatase, SGOT, amylase, or bilirubin either following an attack or induced by morphine. SGOT was the most sensitive indicator in the 12 cases presented, [illegible] elevated in the majority. Preoperative i.v. [illegible] ngiograms carried out in 8 patients were not helpful. An operative cholangiogram was performed in all cases, and 6 of the cases showed distal stenosis of the duct. Normal operative cholangiograms were obtained in 5 cases, while only 2 showed dilatation. Choledochotomy and transverse duodenotomy were carried out in each patient regardless of roentgenographic evidence. The ampullae and sphincter lumen size were directly calibrated with Bakes dilators. The sphincter measured 3 mm or less in all cases; in the majority of cases even a 1 mm probe passed only with difficulty or not at all. Extensive sphincteroplasty (2-3 cm in length) was then performed, taking [illegible]t care to connect the duodenal mucosa to the common duct mucosa without impinging on the pancreatic duct or its orifice.

8819 DISAPPEARANCE OF PHENAZONE FROM PLASMA IN PATIENTS WITH OBSTRUCTIVE JAUNDICE.

(E.) Elfstrom, J.; Lindgren, S. (Surg. Clin., Univ. Linkoping, Sweden). *Eur. J. Clin. Pharmacol.* 7(6):467-471, 1974.

Gas chromatography (4'-methylphenazone internal standard) was used to determine the plasma half-life of phenazone in 2 groups of patients surgically treated for obstructive jaundice. The elimination rate of the drug reflects the ability of the liver to hydroxylate it and possibly other drugs as well. The cause of jaundice in 1 group of 11 patients (7 women and 4 men, 21-77 yr old) was a stone in the common bile duct. Studies were performed on these patients both during the icteric period and 3 months later following obstruction relief and return of plasma bilirubin to normal. A separate group of 5 patients (4 women and 1 man, 55-72 yr old) with jaundice due to malignant disease was studied only once. Statistical analysis of the phenazone elimination rates failed to show a uniform correlation between such rates and obstructive jaundice. The excretion of phenazone in the bile of 2 non-icteric patients was less than 2% of the dose administered. The ability of the liver to hydroxylate phenazone does not appear to be significantly altered in patients with obstructive jaundice of the degree usually encountered in the surgical clinic.

8820 PROLONGED OBSTRUCTIVE JAUNDICE AND HAEMANGIOMATOSIS.

(E.) Sardemann, H.; Tygstrup, I. (Rigshosp., Copenhagen, Denmark). *Arch. Dis. Child.* 49(8):665-667, 1974.

Two cases of prolonged obstructive jaundice and hemangiomatosis of the skin are reported for infants admitted at 3 weeks and 2 weeks of age. Neither case had a family history of jaundice or vascular tumors. One of the deliveries was uncomplicated, while the other was by cesarean due to fetal distress. The following common features were observed in both patients: walnut-sized placental hemangiomas in combination with several cutaneous hemangiomas which increased in size during the 1st and 2nd weeks and spontaneously regressed after the 4th and 5th week of age; and prolonged jaundice of the obstructive type which reached maximum severity during the 2nd and 3rd week and thereafter regressed concomitantly with the disappearance of the hemangiomas and the hepatomegaly. Although hemangiomas in the porta hepatis were not observed in the 2 patients, it seems probable that hemangiomas obstructed the main bile ducts and that obstruction disappeared when the tumors regressed. The cases reported provide additional grounds for delaying exploratory laparotomy to observe if spontaneous recovery will occur.

8821 TREATMENT OF ACUTE CHOLECYSTITIS BY ROUTINE URGENT OPERATION.

(E.) Salleh, H. B. M.; Balasegaram, M. (Gen. Hosp., Kuala Lumpur, Malaysia). *Br. J. Surg.* 61(9):705-708, 1974.

Diagnostic, operative, morbidity, and mortality data are presented for 218 cases of acute cholecystitis which were routinely treated by urgent cholecystectomy within 12 hr of hospital admission. Diagnosis of acute cholecystitis was made on the basis of plain radiography, symptomatology, and various physical signs. Pain in the epigastrium and/or right hypochondrium was the most common symptom, being present in 95% of the cases. Tenderness in the right hypochondrium and/or epigastrium was the most common sign (90% occurrence). Radiographic results were positive in 62% of the cases. The most frequent radiographic finding was a vague haziness in the right hypochondrium (84 cases), while enlargement of the gallbladder shadow (43 cases) was the next most common finding. Operative findings revealed a diagnostic error of 1.4% (3 cases out of 218). Fewer stones were seen on plain x-rays of the abdomen than were actually found during surgery due to overlying gas shadows, the smallness of some calculi, and the radiolucent quality of some calculi. There was one mortality, a 48-yr old woman who died on the 6th postoperative day from a massive acute myocardial infarction. Wound infection was the commonest postoperative complication, occurring in 15 patients. Paralytic ileus was the next most common (12 cases). A short segment of the cystic duct had to be left behind in 2 patients due to extreme edema and an indefinite outline of the junction between the cystic, common hepatic, and common bile ducts. A deep laceration of the liver occurred in 1 patient with empyema of the gallbladder. Average hospital stay was 9 days. Recurrence of biliary tract disorders occurred in 2 cases.

8822 EXOCRINE FUNCTION OF THE LIVER AND PANCREAS IN PATIENTS WITH CHRONIC CHOLECYSTITIS.

(Rus.) Serediuk, N. N; Barbenko, N. A.; Denisiuk, V. G.; Neiko, E. M. (Ivano-Frankovsk Med. Inst., USSR). *Vrach. Delo* (9):95-98, 1974.

Exocrine function was studied in 67 patients with chronic cholecystitis by determining the bile acid, cholesterol, and bilirubin content in gallbladder and hepatic bile. In 44 patients the total bile acid content was 795 ± 55.3 mg (normal 300-800 mg), and in 23 patients 255 ± 24.4 mg. The analysis of the data revealed biliary insufficiency in 34.3% of the patients. The cholate-cholesterol index was found to be lower both in patients with normal bile secretion and in those with biliary insufficiency. Analysis of the exocrine pancreas showed reduced bicarbonates and increased enzyme formation in patients with normal bile secretion, while lower enzyme activity was observed in patients with biliary insufficiency.

8823 ENDOSCOPIC RETROGRADE CHOLANGIOGRAPHIC EVALUATION OF SCLEROSING CHOLANGITIS. *(E.)*

Lefton, H. B.; Winkelman, E. I. (Cleveland Clin., Ohio). *Cleve. Clin. Q.* 41(3):143-147, 1974.

The use of endoscopic retrograde cholangiography for assessing patients with primary sclerosing cholangitis is illustrated by a case report of a 37-yr-old man re-admitted for symptoms of occasional malaise subsequent to a cholecystectomy performed 3 yr earlier. Liver function studies a month prior to the 2nd admission disclosed the following values: total serum bilirubin 2.1 mg/100 ml; BSP retention 26 mg/100 ml at 45 min; alkaline phosphatase 270 IU; and SGOT 115 Karman U. A skin biopsy was obtained and a diagnosis of porphyria cutania tarda was made. No history of jaundice, pleuritis, or recent change in color of urine or stool were reported. Upon admission an intravenous cholangiogram gave inadequate visualization of the bile duct system. Retrograde cannulation of the ampulla of Vater was performed, and the cholangiograms showed severe hypoplasia and beading of the biliary ducts as well as narrowing of the common bile duct. These changes are compatible with sclerosing cholangitis. The postcannulation course was complicated by gram-negative sepsis with *Enterobacter cloacae* which responded to cephaloridine and gentamicin. Before the patient's discharge, a liver biopsy specimen showed minimal bile stasis with no evidence of acute inflammation. No evidence of γ-A globulin, γ-M globulin, or γ-G globulin was found during immunofluorescence studies of the skin and liver biopsies. The patient was referred to his family physician for follow-up; 1 yr later, without treatment, total serum bilrubin level was 2 mg/100 ml with a direct bilirubin of 0.3 mg/100 ml. The patient had no symptoms except for occasional malaise at the end of the day. The major problem in diagnosing sclerosing cholangitis is differentiating it from carcinoma of the bile ducts; this can be adequately done only by long-term follow-up.

8824 BILE MUCOIDS IN BILIARY TRACT DISEASES.

(Rus.) Sheleketina, I. I.; Leliukhina, E. V. (Dnepropetrovsk Res. Inst. Gastroenterol., USSR). *Vrach. Delo* (8):39-43, 1974.

Biochemical studies of mucoids were made in 27 normal subjects and 90 patients with chronic cholecystitis (23 cases), calculous cholecystitis (28), and postcholecystectomy syndrome (39). The total content of hexosamines, glycoproteins, and hyaluronic acid was determined. Findings indicated that the hexosamine content in hepatic bile shows an average increase of 2-2.8 times normal in bile duct diseases. Patients with calculous cholecystitis and postcholecystectomy syndrome accounted for 75% of cases with elevated hexosamine content. It was found that 69.5% of patients with elevated hexosamine content in C bile exhibited dyscholia involving a drop in the bile acid content, phospholipids and lipid complex, along with an increase in cholesterol and bilirubin. It is suggested that bile mucoids contribute to the growth of gallstones by increasing bile viscosity.

8825 CONGENITAL ABSENCE OF THE GALLBLADDER: REVIEW OF THE LITERATURE AND REPORT OF A NEW CASE. *(E.)*

Langley, J. R.; Hull, D. C. (no affil.). *Am. Surg.* 40(9):548-551, 1974.

A case report of agenesis of the gallbladder is presented along with a literature review of previous cases. A 32-yr-old Negro woman with a 1-week history of epigastric pain, nausea, yellowing of the skin and eyes, and passage of dark urine was admitted for physical examination. Laboratory data included the following: total bilirubin 12.4 mg %; blood glucose 110 mg %; serum amylase 139 U; SGOT

1260 mU/ml; SGPT 755 IU/ml; alkaline phosphatase 186 mU/ml; and LDH 362 IU/ml. The presumed diagnosis was common duct obstruction due to a stone which had passed. Repeated oral cholecystograms failed to show the gallbladder. When laboratory values returned to normal, the patient was admitted for cholecystectomy, with the presumed diagnosis of cholecystitis with cholelithiasis. The undersurface of the liver was explored and no gallbladder found. A liver scan further documented the absence of a gallbladder. An operative cholangiogram performed with Hypaque showed the common duct and liver radicles to be normal. Biopsy of the free edge of the right liver lobe revealed normal liver tissue. The patient was discharged 1 week after operation and has had no specific problems to date. A review of reported incidences of agenesis of the gallbladder indicates that 1/2 or more of such patients show preoperative evidence suggestive of cholecystic disease. The mechanism of pain and jaundice in cases not associated with choledocholithiasis is unknown.

8826 ENDOSCOPIC RETROGRADE CHOLANGIOGRAPHY (ERC) IN THE DIAGNOSIS OF JAUNDICED PATIENTS. *(E.)* Liguory, C.; Caletti, G.; Coffin, J. C.; Gouerou, H. (St. Antoine Hosp., Paris, France). *Rend. Gastroenterol.* 5(3):231-232, 1973.

8827 HEPATIC DRUG METABOLISM AND OXYGEN-UPTAKE IN BILIARY DISEASES. *(E.)* Hietanen, E.; Auranen, A.; Hanninen, O.; Savakis, B. (Dept. Physiol., Univ. Turku, Finland). *Scand. J. Gastroenterol.* 9(27):28, 1974.

8828 BILIARY AND FAECAL BILE ACIDS IN PATIENTS WITH INTERRUPTED ENTEROHEPATIC CIRCULATION. *(E.)* Miettinen, T. A. (Univ. Helsinki, Second Dept. Med., Finland). *Scand. J. Gastroenterol.* 9(27):24, 1974.

8829 COMMON DUCT STRICTURE SECONDARY TO BLUNT ABDOMINAL TRAUMA. *(E.)* Skow, J. R.; Longmire, Jr., W. P. (Univ. California Sch. Med., Los Angeles). *Am. Surg.* 40(10):576-578, 1974.

8830 ACUTE CHOLECYSTITIS FOLLOWING SURGERY AND INJURY. *(E.)* Howard, R. J.; Delaney, J. P. (Univ. Minnesota, Dept. Surg., Minneapolis). *Clin. Med.* 81(8):14-16, 1974.

8831 PRIMARY CARCINOMA OF THE GALLBLADDER: ANALYSIS OF 22 CASES. *(E.)* Balaroutsos, C.; Bastounis, E.; Karamanakos, P.; Golematis, B. (First Surg. Dept., Univ. Athens, Greece). *Am. Surg.* 40(10):605-608, 1974.

8832 DEFERRED REPAIR OF IATROGENIC LESIONS OF THE EXTRAHEPATIC BILIARY TRACT: EXPERIENCE WITH 21 CASES. *(Sp.)* Rodriquez Alvarez, J. L; Devesa Mugica, J. M. (Puerta de Hierro Clin., Natl. Ctr. Med. Surg. Res., Spain). *Rev. Esp. Enferm. Apar. Dig.* 43(6):583-602, 1974.

8833 COMPLEX INTRA-OPERATIVE EXPLORATION OF THE BILE DUCTS AND THE THERAPEUTIC INDICATIONS. *(E.)* Gavriliu, D.; Ionescu-Carus; Pretorian, R.; Grigorescu, A.; Anghel, I.; Ionescu, I. (Davila Hosp., Bucharest, Rumania). *Rom. Med. Rev.* 18(1):67-71, 1974.

8834 HEPATIC LOBECTOMY FOR BILIARY CYSTADENOMA. *(E.)* Forde, K. A.; Wolff, M.; Fuld, S. L.; Price, J. B. (Coll. Physicians and Surgeons, Columbia Univ., New York, N.Y.). *Am. Surg.* 40(11):647-650, 1974.

8835 GALLBLADDER FUNCTION AFTER SELECTIVE PROXIMAL VAGOTOMY. *(E.)* Ahlberg, J.; Ahlback, S.; Holmstrom, B.; Lindell, P.; Sellberg, B. (St. Goran's Hosp., Stockholm, Sweden). *Scand. J. Gastroenterol.* 9(27):21, 1974.

See also, 8317, 8323, 8385, 8438, 8458, 8459, 8603, 8726, 8746.

GENERAL

8836 ZOLLINGER-ELLISON SYNDROME. ULTRASTRUCTURAL AND HISTOCHEMICAL OBSERVATIONS IN A CHILD WITH ENDOCRINE TUMORLETS OF GASTRIC ANTRUM. *(E.)* Bhagavan, B. S.; Hofkin, G. A.; Woel, G. M.; Koss, L. G. (Sinai Hosp., Baltimore, Md.). *Arch. Pathol.* 98(4):217-222, 1974.

A case of Zollinger-Ellison syndrome associated with multifocal hyperplasia (tumorlets) of gastric antral endocrine cells was found in an 11-yr-old boy. The tumorlets were located predominantly within the lamina propria and were composed of uniform cells with vesicular round nuclei and well-defined cystoplasmic membranes. The pattern and arrangement of these cells resembled carcinoid-islet cell tumors. Cells of small nodules showed transition to cells in the bottom and midportions of the pyloric gland. Similar tumorlets were present in the resected proximal duodenum, but no evidence of abnormality was found in the subtotally resected pancreas. Histochemical analysis indicated that the component cells of the tumorlets had many features in common with gastrin-containing G cells. The cells were nonreactive to argentaffin stains, to toluidine blue metachromasia, and to the Bodlian and modified Davenport silver stains. Areas of cell proliferation were argyrophilic with the Bodlian technique, whereas the centers of the tumors were nonargyrophilic. Therefore, while the centers of the tumorlets are closely related to G cells, the diffuse cell hyperplasia may belong to 1 or more members of the wide spectrum of enterochromaffin-argryophilic cell systems of the stomach and intestinal tract. The ultrastructure of the G cells demonstrated secretory granules of 150-300 mμ in diameter. Persistent postoperative hypergastrinemia (45,000 pg/ml serum gastrin) and hyperserotoninemia (0.48 μg/ml serotonin) was thought to be related to residual tumorlets in the part of the duodenum or jejunum left *in situ*.

8837 GASTRIC ENDOCRINE CELL PROLIFERATION: ASSOCIATION WITH ZOLLINGER-ELLISON SYNDROME. *(E.)* Bordi, C.; Cocconi, G.; Togni, R.; Vezzadini, P.; Missale, G. (Inst. Pathol. Anat., Univ. Parma, Italy). *Arch. Pathol.* 98(4):274-278, 1974.

A proliferation of endocrine cells was observed in the fundic-type mucosa (oxyntic gland area) of the stomach of a 32-yr-old man with the Zollinger-Ellison syndrome. The cells did not contain gastrin, as shown by immunofluorescence and tissue immunoassay. The cells were located along the basement membrane of the glands and often formed a continuous layer. Their ultrastructure was similar to that of the so-called enterochromaffin-like cells. Small secretory granules, membrane-limited vacuoles with a small dense core, parallel array of rough endoplasmic reticulum cisternae, and numerous mitochondria were evident. On light microscopy, the proliferated cells were stained by the silver methods of Grimelius and Sevier-Munger and differed from the true enterochromaffin cells because of the lack of the argentaffin reaction, diazo reaction, and formalin-induced autofluorescence. The frequency of argyrophil cells of gastric body mucosa was significantly greater in the patient than in 20 other patients with gastric ulcer, duodenal ulcer, or gastric cancer.

8838 ACUTE GASTROENTERITIS ASSOCIATED WITH REOVIRUS-LIKE PARTICLES. II. *(E.)* Flewett, T. H.; Davies, H.; Bryden, A. S.; Robertson, N. J. (East Birmingham Hosp., England). *J. Clin. Pathol.* 27(8):608-614, 1974.

Virus particles resembling reoviruses or orbiviruses were found in feces from 40 of 73 patients under 6 yr with acute gastroenteritis and in feces from only 1 (a 20-yr-old man) of 59 gastroenteritis patients over 6 yr. Among 89 patients admitted with diagnoses other than gastroenteritis, the virus particles were present only in the feces of two 1-month-old infants with Hirschsprung's disease and "unsatisfactory development", resp. Morphologically the particles resembled orbiviruses more than reoviruses, but they differed from the orbiviruses in having a smooth, circular outline with a well-marked continuous rim as seen in negatively stained preparations. The particles could not be agglutinated by antisera to reovirus types 1, 2, and 3. They may be members of a new group of double-stranded RNA (diplorna) viruses.

8839 COMPARISON OF THREE AGENTS OF ACUTE INFECTIOUS NONBACTERIAL GASTROENTERITIS BY CROSS-CHALLENGE IN VOLUNTEERS. *(E.)* Wyatt, R. G.; Dolin, R.; Blacklow, N. R.; DuPont, H. L.; Buscho, R. F.; Thornhill, T. S.; Kapikian, A. Z.; Chanock, R. M. (Lab. Infect. Dis., Natl. Inst. Allergy and Infect. Dis., Bethesda, Md.). *J. Infect. Dis.* 129(6): 709-714, 1974.

Two family outbreaks of acute infectious nonbacterial gastroenteritis occurring in Hawaii and Maryland are reported. Symptoms consisted of headache, malaise, anorexia, nausea and vomiting and diarrhea. Recovery was complete without sequelae. Stool ultrafiltrates from these patients reproduced the symptoms following inoculation into healthy volunteers. Similar symptoms were also produced by inoculations of filtrates containing the previously described viral Norwalk agent. Cross challenge studies of subjects with Norwalk agent and one of the two new agents indicated that the Norwalk and Hawaii agents were antigenically dissimilar whereas the Norwalk and Maryland agents were related.

8840 ACRODERMATITIS ENTEROPATHICA. A CLINICAL AND BIOCHEMICAL SURVEY. *(E.)* Neldner, K. H.; Hagler, L.; Wise, W. R.; Stifel, F. B.; Lufkin, E. G.; Herman, R. H. (Univ. Colorado Med. Ctr., Denver). *Arch. Dermatol.* 110(5):711-721, 1974.

A 21-yr-old girl with acrodermatitis enteropathica has been successfully treated with diiodohydroxyquin (650 mg 1-4 times/day) since age 18 months. The major continuing consequence of her disease was occasional mild diarrhea. Trial periods without diiodohydroxyquin resulted in erythematous dermatitis of her hands, feet, and face with secondary bacterial infection. To determine possible causes of the disease and the reasons for the efficacy of diiodohydroxyquin, controlled studies on a metabolic ward were carried out over a 2 1/2 yr period, both with and without diiodohydroxyquin treatment. The proposed defect in tryptophan metabolism reported in the literature could not be verified: urinary excretion of tryptophan metabolites following a standard p.o. tryptophan load, with or without pyridoxine stimulation, was essentially normal. Diiodohydroxyquin did not substantially affect tryptophan metabolism. Jejunal glycolytic enzymes showed a normal adaptive response to changes in diet and p.o. folic acid; in the patient and some controls, glycolytic enzyme activity increased with diiodohydroxyquin treatment. When the patient was not receiving diiodohydroxyquin, electron microscopy demonstrated abnormal jejunal cytoplasmic inclusions in the fasting state. Serum lipids were consistently low, and lipoprotein electrophoresis showed hypobetalipoproteinemia. Arachidonic acid levels were repeatedly low but reached their lowest value while the patient was not taking diiodohydroxyquin. The results suggest that a defect in fatty acid metabolism is implicated in acrodermatitis enteropathica. Since 2 prostaglandins are derived from arachidonic acid, prostaglandins could be the final mediators of the clinical expression of the disorder.

8841 ACRODERMATITIS ENTEROPATHICA ASSOCIATED WITH LOW DENSITY LIPOPROTEINS DEFICIENCY.

(E.) Wallis, K.; Azizi, E.; Kook, A. J.; Herczeg, E.; Julsary, A.; Szeinberg, A.; Zaidman, J. L. (Asaf Harofe Gov. Hosp., Zerifin, Israel). *Clin. Pediatr.* 13(9):749-754, 1974.

The propositus, a male infant (age 1 month), was hospitalized with acute diarrhea. He was born to healthy unrelated parents of Libyan origin. Pregnancy had been normal. He had 2 healthy sisters, aged 10 and 5 yr. One other infant boy had died at 3 months of age some years earlier from acute gastroenteritis of unknown origin, after hospitalization for malnutrition with severe diarrhea. During hospitalization, i.v. fluids were given to correct severe dehydration and acidosis. Various antibiotics were administered. Diarrhea and vomiting persisted and dermatologic changes noted near and at the angles of the mouth, on the chin, cheeks, left ear, neck, fingers, thighs, sacral region, exterior surfaces of the elbows, and on the scrotum progressed. Levels of different lipid components were low and remained so due to complete absence of β-lipoproteins as demonstrated by paper and cellogel electrophoresis. During the 2nd month of hospitalization, acrodermatitis enteropathica was diagnosed. Diiodoquine treatment (55.5 mg, 4 times/day for 5 days) gave no improvement. The dose was raised to 210 mg, 4 times/day; no improvement followed and death occurred on the 67th day after hospitalization. Autopsy showed pronounced degrees of atrophy in the small and large intestine. In the small intestine the mucosal villi were broad and not sharply delineated. The mucosa of the large intestine showed Lieberkuhn's crypts rare and straight. Vacuoles in the epithelium of the small intestine of the type present in β-lipoproteinemia were not found. After the propositus' death, another sister, now 6 months of age, was born. Serum lipoprotein electrophoretic studies performed on the younger sister at 1 1/2 months of age showed almost total absence of low density lipoprotein fractions. The electrophoretic pattern of other family members was normal with the exception of the father. Immunodiffusion studies indicated that all family members, including the infant girl, contain antigenically reactive β-lipoproteins. Electrophoretic analysis of the serum lipoproteins of this infant at 2 1/2 and 3 1/2 months show increased proportions of the serum low density lipoproteins. The values for total lipids and various fractions showed that the infant girl's serum had very low levels of total serum lipids, phospholipids, total cholesterol, and, in particular, total triglycerides. A content of triglycerides above normal levels was found in the father's serum. This may be the 1st time that a complete absence of antigenically reactive serum β-lipoproteins has been described in a disease other than αβ-lipoproteinemia.

8842 YERSINIOSIS AS AN INTERNAL DISEASE.

(E.) Leino, R.; Kalliomaki, J. L. (Dept. Med., Univ. Turku, Finland). *Ann. Intern. Med.* 81(4):458-461, 1974.

From 1971-1973, 60 patients were hospitalized for an infectious disease caused by *Yersinia enterocolitica* serotypes II and IX or *Yersinia pseudotuberculosis* serotype I. At the same time 65 patients with similar symptoms were treated as outpatients. Diagnosis was based mainly on elevated antibody titers against these microorganism: 43 cases of infection were caused by *Y. enterocolitica* II, by *Y. enterocolitica* IX, and 4 by *Y. pseudotuberculosis*. The most prominent symptoms were fever (43 cases), diarrhea (27), abdominal pains (20), erythemia nodosum (11), and arthritis (33). One patient was 1st operated on for suspected acute appendicitis; 1 developed chronic colitis, and another had acute glomerulonephritis, both possible caused by yersiniosis. One patient had mild hepatitis and 4 showed electrocardiographic signs of mycocarditis although no murmurs were heard. All patients were treated with antibiotics (tetracyclines or a combination of trimethoprim and sulfamethoxazole. In most cases synovial edema disappeared after a few months with the exception of 2 patients with synovial effusion in the knee as late as 1 yr after treatment. Many patients reported very prolonged arthralgia. The data suggest that some patients previously diagnosed as having rheumatic fever actually had yersiniosis.

8843 ALIMENTARY TRACT METASTASES FROM MALIGNANT MELANOMA.

(E.) Beckly, D. E. (Bristol Hosp., England). *Clin. Radiol.* 25(3):385-389, 1974.

Radiologic findings are presented for 3 patients with alimentary tract metastases from malignant melanoma. A 31-yr-old man presented with malaise, anorexia, and weight loss associated with epigastric discomfort. An axillary malignant melanoma had been exercised 7 months earlier, although no primary site was found. Barium enema examination showed a large filling defect in the stomach with a central collection of barium within the mass. Coarse mucosal folds were present in the remainder of the stomach. The histology was that of an anaplastic tumor. Laparotomy revealed a large gastric mass and another tumor in the jejunum; histologically, this tumor was a nonpigmented melanoma. On the 7th day after a Polya gastrectomy and local jejunum resection, the patient died from a massive intra-abdominal hemorrhage. Autopsy showed metastatic melanoma in the brain, lungs, and jejunum. An 88-yr-old man presented with ankle edema, shortness of breath, and vomiting. A malignant melanoma had been excised from the neck the previous yr. Barium meal examination showed filling in the 1st part of the duodenum with re-entrant angles at the junctions with the duodenal wall. No central collections of barium were identified. The patient's poor condition did not permit surgery. Autopsy revealed bronchopneumonia and metastatic melanoma in the duodenum, ileum, and transverse mesocolon. Presenting symptoms in a 56-yr-old man were lethargy, shortness of breath, and vague epigastric discomfort. His history included excision of a malignant melanoma from the back 2 yr previously and subsequent reccurrence at the primary site and in the axilla. Barium examination indicated a deformed duodenal cap, widening of the lumen, and rounded filling defects in the 2nd part of the duodenum. Several filling defects showed re-entrant angles at their junction with the duodenal wall. A duodenal ulcer was found at autopsy together with numerous tumor masses in the duodenum, jejunum, and upper ileum. Histologic examination confirmed malignant melanoma. In patients with multiple gastrointestinal lesions and history of a previous malignant melamona, metastases should be suspected and a search should be made for metastases at other sites. In the case of a single gastrointestinal lesion, diagnosis should be based on biopsy as well as barium studies.

8844 INHIBITION OF GASTRIC ACID SECRETON BY EXTRACT OF WDHA TUMOR.

(E.) Vogel, T. T. (Ohio State Hosp., Columbus). *Am. J. Surg.* 128(5): 657-658, 1974.

Transplantation of the antrum to the transverse colon produced gastric hypersecretion in rats. Over a 2-hr collection period, acid output almost tripled compared with control values and volume almost doubled. Acid extracts of a watery diarrhea hyperchloremia achlorhydria (WDHA) tumor (2.5 mg/kg s.c.) reduced acid output by 40%. Secretin (75 U/kg) reduced secretion by about 80%. Acid extracts of the same tumor had produced secretin-like effects on pancreatic and biliary secretion in the dog. Since vasoactive intestinal peptide has been isolated from WDHA tumors, the hormone or hormones present in the tumors may not be identical to those normally present. Effects of a WDHA extract on gastric motility, the 4th physiologic action of secretin, were not determined.

8845 IMMUNITY TO EXPERIMENTAL CHOLERA. I. PROTECTIVE EFFECT OF HUMORAL IgG ANTITOXIN DEMONSTRATED TO PASSIVE IMMUNIZATION.

(E.) Pierce, N. F.; Reynolds, H. V. (Baltimore City Hosp., Md.). *J. Immunol.* 113(3):1017-1023, 1974.

The protective role of serum immunoglobulin G (IgG) antitoxin was studied in dogs transfused i.v. with whole plasma (15 ml/kg, antitoxin titer 2700 U/ml) or purified IgG (1.3 mg/kg, antitoxin titer 18,293 U/ml) from hyper-immunized dogs. Plasma infusion in dogs with jejunal Thiry-Vella loops increased the mean serum antitoxin titer 20-fold compared with control values and afforded significant protection against intraluminal challenge with cholera toxin (100 mg). This protection was not diminished by prior washing of the jejunum with 0.85% NaCl. Recovery of heat-labile antitoxin from jejunal washings was entirely parallel to serum antitoxin activity, which peaked at 535 U/ml 1 day after the 2nd transfusion of high-titered plasma. All antitoxic activity in plasma and jejunal washings was of the IgG class. Intact dogs transfused with antitoxic serum IgG were highly protected (82%) against orogastric challenge with viable *Vibrio cholerae* and had a mean serum antitoxin titer 30-fold greater than in controls. These results indicate that serum IgG plays a protective role at the surface of the gut mucosa or within its lumen. An appreciable proportion of serum-derived antibody appears intimately associated with the mucosal surface, where it may be protected from rapid destruction by proteolytic enzymes.

8846 ELECTRON MICROSCOPIC STUDY ON T MUCOSA IN HUMAN CHOLERA.

H.; Tsuchiya, M.; W
A.; Morishita, T.; Eukumi, H.; Ohashi, M.; Castr, A.;
Uylanogc, C. (Sch. Med., Keio Univ., Tokyo, Japan).
Gut 15(7):531-544, 1974.

Small intestinal mucosa obtained from 6 fasting pa
tients with cholera (4 men and 2 women, aged 24-46 yr)
by a p.o. biopsy technique was studied with the elec-
tron microscope. The cultures of the
were all positive for *Vibrio cholerae*.
sorptive cells, large pseudopod-like cytoplasm
processes with deformed microvilli or without
villi (blebs) projected into the intestinal lumen
from the apical cell surface, interrupting the micro-
villous border. In the intestinal crypt, many undif-
ferentiated cells possessed pseudopod-like cytoplasmi
projections that extended into the crypt lumen. The
swelling of mitchondria, disappearance of mitochon-
drial cristae, an increase in the number of vesicles
of the Golgi apparatus, and dilation and vesiculation
of endoplasmic reticulum were observed in the epithe-
lial cells. The apical portion of epithelial
at the base of villi was edematous. Cytoplasm
fragments enclosed by a plasma membrane, desq
epithelial cells, cytoplasmic organelles, and
tory granules were lying free in the intestinal lum
Marked irregular widening of the interepithelial
spaces in the jejunal mucosa was apparent at the mid-
villous area. There were many cystic vacuoles in
the epithelial cytoplasm which contained abundant
fluid. Whether these vacuoles indicate de
epithelial changes, transport of fluids in
plasm, or accumulation of some substance p
endoplasmic reticulum is not known. The re
gest that the degree of cholera diarrhea depen
the severity of the epithelial changes and the
ber of epithelial cells with cytoplasmi

8847 CALCIUM-BINDING PROTEIN AND VIT METABOLISM IN EXPERIMENTAL PROT TRITION.

(E.) Kalk, W. J.; Pimstone, B.
Cape Town Med. Sch., South Africa). *B*
(3):569-578, 1974.

Intestinal and renal vitamin D-dependent
binding protein (CaBP) activity and vitam
olism were investigated in protein-def
rats (40 g/kg/day casein diet) and in
mals (200 g/kg/day casein diet).
weeks intestinal CaBP activity of
protein diet was 70.7 ± 3.4% of the contr
renal CaBP activity was not significantly
Rats fed a diet deficient in both protein
D had an intestinal CaBP activity which w
the value for controls on a vitamin D-suf
in rats fed a high-protein, vitamin D-
CaBP activity was 59.9% of the control
ministration of vitamin D_3 (100 μg i.p
bled intestinal CaBP activity in both
cating the potential of the intestinal muc
spond to pharmcological doses of vitamin D
rate of conversion of ^{3}H-vitamin D_3 (540
to 25 hydroxycholecalciferol (25-HCC) and
ance rates of plasma 25-HCC were similar i

deficient and protein-sufficient rats. Hydroxylation of vitamin D_3 to 25-HCC occurs in the liver and was almost complete 2 hr after injection of labeled vitamin D_3 in both groups. Similarly, the rapid disappearance of 25-HCC from the plasma of protein-deficient and control animals suggests that renal hydroxylation of vitamin D_3 is normal in protein-deficient animals. In these animals reduced CaBP is probably a result of reduced CaBP synthesis as a consequence of deficient amino acid substrate, rather than hepatic or renal abnormalities in vitamin D_3 metabolism.

8848 ARTHRITIS AND INTESTINAL DISEASES: A COMPARISON OF TWO FAMILY STUDIES.

(E.) Haslock, I.; Macrae, I. F.; Wright, V. (Gen. Infirm., Leeds, England). *Rheumatol. Rehabil.* 13(3):135-140, 1974.

In a survey of the musculoskeletal complications of ulcerative colitis and Crohn's disease, 91 patients with ulcerative colitis, 116 patients with Crohn's disease, and 449 of their relatives and spouses were examined clinically and radiologically. A further 96 relatives and spouses were reviewed radiologically only. Intestinal synovitis was diagnosed in 11 probands with ulcerative colitis and 24 with Crohn's disease. The pattern of joint involvement was similar in the 2 family studies, with large joints predominating over small limbs and lower-limb joints over upper limbs. In both series the knee was most commonly affected. Sacro-iliitis was found in similar proportions of probands, first-degree relatives, second-degree relatives, and spouses in each study. More of the subjects in the ulcerative colitis group were diagnosed as having ankylosing spondylitis, while a greater proportion of subjects with sacroiliitis in the Crohn's disease study were female. It is possible that the lower incidence of definite ankylosing spondylitis in the Crohn's study reflected an increased effort in rejecting back pain which was felt to be insignificant.

8849 REACTION OF HUMAN SMALL INTESTINE TO AN INTRALUMINAL TUBE AND ITS IMPORTANCE IN JEJUNAL PERFUSION STUDES.

(E.) Cook, G. C.; Carruthers, R. H. (Dept. Med., Univ. Zambia, Lusaka). *Gut* 15(7):545-548, 1974.

A double-lumen tube with a mercury weight attached to its distal end was positioned in the small intestine of 6 subjects (4 men and 2 women, aged 25-44 yr) prior to elective laparatomy. Clinical diagnosis of the patients was left ureteric calculus (1); carcinoma of urinary bladder, and *Schistosoma haematibium* infestation (2), duodenal ulcer (2), and no abnormality (1). Marked "concertinaing", or gathering of the small intestine proximal to the mercury weight, was seen at laparotomy in all 6 subjects. The ratio between the mean intestinal length from the mercury weight to the ligament of Treitz after removal of the tube to that with the tube *in situ* was 3.0 (2:5-3:8). Mean total jejuno-ileal length was 421 (320-521) cm. In 5 subjects the distal end of the tube was more than half way between the ligament of Treitz and the ileocecal valve although it was only 100-120 (mean 108) cm from the incisor teeth. The data indicate that segmental perfusion studies of the human jejunum involve a much longer length of small intestine than is generally assumed. Such studies assess absorption rates over a substantial proportion of the small intestine and are not confined to a short (30 cm) segment of the proximal jejunum. Therefore, the nutritional importance of absorption studies of amino acids, peptides, and carbohydrates is increased. Studies to measure absorption rates from the ileum should be treated with caution as part or all of the perfusion segment may be past the ileo-cecal valve.

8850 INCIDENCE AND SIGNIFICANCE OF FAECAL HYDROXYSTEARIC ACID IN ALIMENTARY DISEASE.

(E.) Wiggins, H. S.; Pearson, J. R.; Walker, J. G.; Russell, R. I., Kellock, T. D. (Central Middlesex Hosp., London, England). *Gut* 15(8):614-621, 1974.

Three-day fecal collections were obtained from 87 patients with a variety of gastroenterological diagnoses and 12 controls while consuming normal diets. Fecal weight, total fatty acids, and the proportion of hydroxystearic acid (OHSA) were measured. All patients had some easily detectable OHSA. In general, the percentage of OHSA increased with increasing fecal output; thus most patients excreting less than 20 g/day fat had less than 5% OHSA, while those with greater steatorrhea had levels of 6-23%. This trend was true for patients with chronic pancreatitis, diffuse small intestinal mucosal disease, partial gastrectomy, irritable bowel syndrome, and most of 16 patients with miscellaneous diagnoses. Exceptions were patients with mild steatorrhea with ileal disease, ileal resections without colonic resection, or bacterial colonization, all of whom had more than 5% OHSA. Patients with ileal resections who had undergone removal of most of the colon had normal OHSA levels, indicating that the colon is the main site of OHSA formation in ileal resection patients. Whether OHSA has a specific cathartic action could not be determined since the data implicate total fatty acids to the same extent.

8851 DETECTION AND LOCALIZATION OF AN OCCULT VESICOENTERIC FISTULA.

(E.) Prokop, E. K.; Buddemeyer, E. U.; Strauss, H. W.; Wagner, Jr., H. N. (Johns Hopkins Med. Inst., Baltimore, Md.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 21(4):811-818, 1974.

Detection and localization of an enterovesicular fistula in a 43-yr-old woman with a 14-yr history of chronic inflammatory bowel disease and recurrent urinary tract infection was accomplished by following a bolus of p.o. ^{198}Au-colloid (100 μc) as it tranversed the gastrointestinal tract with serial scintiphotos and simultaneously monitoring the urine. The ^{198}Au appeared in the urine between the image taken at 1 hr and 30 min and 1 hr and 45 min, suggesting that the fistula was located in the area involving the terminal ileum and ascending colon. To confirm the site of the fistula, a mixture of barium and tracer (50 μC) was administered rectally. The tracer did not appear in the urine until the barium reached the area of the cecum. Laparotomy showed that the cecum was adherent to the bladder, but no fistula was demonstrable by methylene blue instillation into the bladder. Postoperatively, the urinary tract infection cleared, and reexamination with p.o. ^{198}Au-colloid revealed no activity in the urine. The radiation dose to the gonads in this procedure is 42 mrads. The procedure is safe, simple to perform, and well tolerated.

8852 SEVERE UPPER G-I BLEEDING. A PROSPECTIVE STUDY. *(E.)* Krause, U.; Wiklund, L.; Rimsten, A. (Acad. Hosp., Uppsala, Sweden). *Scand. J. Gastroenterol.* 9(27):11, 1974.

8853 EMERGENCY X-RAY EXAMINATION AT UPPER GASTROINTESTINAL BLEEDING. *(E.)* Madsen, O. G. (Community Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(27):10, 1974.

8854 EMERGENCY ENDOSCOPY IN PATIENTS WITH UPPER GASTROINTESTINAL BLEEDING. *(E.)* Siemssen, O.; Christiansen, L. A.; Nielsen, O. V. (Rigshosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9 (Suppl. 27):7, 1974.

8855 EVALUATION OF EARLY ENDOSCOPY IN GASTROINTESTINAL BLEEDING. *(E.)* Kalima, T. V.; Fraki, O.; Kivilaakso, E. (2nd Dept. Surg., Univ. Helsinki, Finland). *Scand. J. Gastroenterol.* 9(27):49-50, 1974.

8856 PULMONARY ARTERY PRESSURE MEASUREMENTS IN PATIENTS WITH ACUTE UPPER GASTROINTESTINAL BLEEDING. *(E.)* Sorensen, M. B.; Christiansen, L. A.; Malmstrom, J.; Bille Brahe, N. E. (Rigshosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(27):14, 1974.

8857 EARLY ENDOSCOPY IN PATIENTS WITH ACUTE UPPER GASTROINTESTINAL BLEEDING. *(E.)* Kruse, A.; Skovgaard, S.; Sorensen, F. H.; Bone, J. (Aarhus Commun. Hosp., Denmark). *Scand. J. Gastroenterol.* 9(Suppl. 27):7, 1974.

8858 GASTROINTESTINAL POLYPS. *(Ger.)* Ottenjann, R.; Barthelheimer, W.; Lux, G.; Busse, R. (Munic. Hosp., Munich-Neuperlach, Germany). *Munch. Med. Wochenschr.* 116(43):1861-1864, 1974.

8859 METASYNCHRONOUS AND SYNCHRONOUS NEOPLASMS WITH METASTASES IN A 47-YEAR-OLD WOMAN. *(Ger.)* Zawirska, B.; Rabczynski, J. (Med. Acad., Wroclaw, Poland). *Zentralbl. Allg. Pathol.* 118(2/3): 226-231, 1974.

8860 PHASE II STUDY OF CCNU (NSC-79037) IN THE TREATMENT OF ADVANCED GASTROINTESTINAL CANCER. *(E.)* Klaassen, D. J.; Rapp, E. (Ontario Cancer Fdn., Ottawa, Canada). *Cancer Chemother. Rep.* 58(5): 667-669, 1974.

8861 SOME METABOLIC FUNCTIONS OF LIVER IN PATIENTS WITH ADVANCED NON-HEPATIC CANCER. *(E.)* Basu, T. K.; Raven, R. W.; Williams, D. C. (Marie Curie Mem. Fdn., Oxted, England). *Oncology* 29(5):417-421, 1974.

8862 COMPARISON BETWEEN NEUTRON THERAPY AND ^{60}Co GAMMA RAY THERAPY OF BRONCHIAL, GASTRIC AND OESOPHAGUS CARCINOMATA. *(E.)* Eichhorn, H. J.; Lessel, A.; Matschke, S. (Central Inst. Cancer Res., Berlin, Germany). *Eur. J. Cancer* 10(6):361-364, 1974.

8863 INTESTINAL COMPLICATIONS AFTER GYNAECOLOGICAL OPERATIVE AND RADIATIVE THERAPY. *(E.)* Aho, A. J.; Linna, M. I.; Gronroos, M. (Dept. Surg., Univ. Turku, Finland). *Scand. J. Gastroenterol.* 9(27): 44, 1974.

8864 EXPERIMENTAL STUDY OF THE COMBINED EFFECT OF URANIUM AND RADIUM ON THE BODY. *(Rus.)* Sviatkina, N. C.; Novikov, Iu. V. (Uzbek Res. Inst. Sanit., Hyg., Occup. Dis., Tashkent, USSR). *Gig. Sanit.* (8):35-41, 1974.

8865 PRINCIPLES OF TREATING GASTROINTESTINAL DISEASE RESULTING FROM FOOD ALLERGIES. *(Ger.)* Werner, M. (Distr. Hosp., Pinneberg, Germany). *Dtsch. Med. Wochenschr.* 99(36):1775-1779, 1974.

8866 HISTAMINE IN THE PATHOGENESIS OF FOOD-POISONING. *(Rus.)* Chuikov, L. I. (Kharkov Med. Inst., USSR). *Vrach. Delo* (9):147-150, 1974.

8867 CHEMOTHERAPY OF ACUTE SALMONELLOSIS AND DURATION OF THE CARRIER STATE AFTER RECOVERY. *(Ger.)* Keller, H. (Tiefenauspital, Univ. Bern, Switzerland). *Schweiz. Med. Wochenschr.* 104(40):1419-1422, 1974

8868 FOODBORNE SHIGELLOSIS AT A COUNTRY FAIR. *(E.)* Weissman, J. B.; Williams, S. V.; Hinman, A. R.; Haughie, G. R.; Gangarosa, E. J. (Ctr. Dis. Control, Atlanta, Ga.). *Am. J. Epidemiol.* 100(3): 178-185, 1974.

8869 AN OUTBREAK OF Shigella sonnei GASTROENTERITIS ON COLORADO RIVER RAFT TRIPS. *(E.)* Merson, M. H.; Goldmann, D. A.; Boyer, K. M.; Peterson, N. J.; Patton, C.; Everett, L. G.; Downs, H.; Steckler, A.; Barker, Jr., W. H. (Ctr. Dis. Control, Atlanta, Ga.). *Am. J. Epidemiol.* 100(3):186-196, 1974.

8870 SURVEY ON THE INCIDENCE OF Yersinia enterocolitica INFECTION IN CANADA. *(E.)* Toma, S.; Lafleur, L. (Ministry Health, Toronto, Canada). *Appl. Microbiol.* 28(3):469-473, 1974.

8871 Vibrio parahaemolyticus IN SEAWATER OFF THE PACIFIC COAST OF PANAMA. *(E.)* Kourany, M.; Kinney, R. J.; Vasquez, M. A. (Gorgas Mem. Lab., Panama). *Am. J. Trop. Med. Hyg.* 23(4):714-715, 1974.

8872 SALMONELLOSIS AND SHIGELLOSIS AT BOSTON CITY HOSPITAL. PART I. RELATIONSHIP TO BACTEREMIC INFECTIONS DUE TO ENTEROBACTERIA. *(E.)* Finland, M.; Barnes, M. W. (Boston City Hosp., Mass.). *JAMA* 229(9):1183-1186, 1974.

8873 Vibrio parahaemolyticus GASTROENTERITIS OUTBREAK IN COVINGTON, LOUISIANA, IN AUGUST 1972. *(E.)* Barker, Jr., W. H.; Mackowiak, P. A.; Fishbein, M.; Morris, G. K.; D'Alfonso, J. A.; Hauser, G. H.; Felsenfeld, O. (Ctr. Dis. Control, Atlanta, Ga.). *Am. J. Epidemiol.* 100(4):316-323, 1974.

8874 MECONIUM PLUG SYNDROME AND MATERNAL ADMINISTRATION OF MAGNESIUM SULFATE. *(E.)* Rosevear, W. H.; Cooney, D. R.; Grosfeld, J. L. (Riley Children's Hosp., Indianapolis, Ind.). *Clin. Res.* 22(4):664A, 1974.

8875 THE ROLE OF INTESTINAL GAS IN FUNCTIONAL ABDOMINAL PAIN. *(E.)* Lasser, R. B.; Bond, J. H.; Levitt, M. D. (VA Hosp., Minneapolis, Minn.). *Clin. Res.* 22(4):635A, 1974.

8876 THE ROLE OF ENTEROSTOMAL THERAPISTS AND STOMA REHABILITATION CLINICS: A SECOND LOOK. *(E.)* Lenneberg, E. S. (New England Deaconess Hosp., Boston, Mass.). *Cancer* 34(3):977-982, 1974.

8877 DIAGNOSTIC PROBLEMS OF ACUTE ABDOMINAL DISEASES IN THE AGED. *(E.)* Fenyo, G. (Soder Hosp., Stockholm, Sweden). *Acta Chir. Scand.* 140(5):396-405, 1974.

8878 MALIGNANT ONCOCYTOMA OF THE PAROTID GLAND. *(E.)* Fayemi, A. O.; Toker, C. (Mount Sinai Sch. Med., New York, N.Y.). *Arch. Otolaryngol.* 99(5):375-376, 1974.

8879 MINOCYCLINE IN THE TREATMENT OF CHOLERA. A COMPARISON WITH TETRACYCLINE. *(E.)* Guha Mazumder, D. N.; Sirkar, B. K.; De, S. P. (Infect. Dis. Hosp., Calcutta, India). *Indian J. Med. Res.* 62(5):712-718, 1974.

8880 IBUPROFEN (BRUFEN) IN CHOLERA AND OTHER DIARRHOEAS. *(E.)* De, S.; Sircar, B. K.; Sasmal, D.; De, S. P.; Mondal, A. (Infect. Dis. Hosp., Calcutta, India). *Indian J. Med. Res.* 62(5):756-764, 1974.

8881 DIFFERENTIAL DIAGNOSIS OF DIARRHOEA IN ADULTS. *(E.)* Bell, D. R. (Liverpool Sch. Trop. Med., England). *Practitioner* 213(1273):47-53, 1974.

8882 EPIDEMIOLOGICAL ASPECTS OF NEONATAL NECROTIZING ENTEROCOLITIS. *(E.)* Virnig, N. L.; Reynolds, J. W. (St. Paul Children's Hosp., Minn.). *Am. J. Dis. Child.* 128(2):186-191, 1974.

8883 AGAMMAGLOBULINEMIA WITH B LYMPHOCYTES IN A NEONATE WITH ACRODERMATITIS ENTEROPATHICA. *(E.)* Pass, R. F.; Johnston, Jr., R. B.; Cooper, M. D. (Univ. Alabama Med. Ctr., Birmingham). *Am. J. Dis. Child.* 128(2):251-253, 1974.

8884 EXTENDING THE SCOPE OF THE VATER ASSOCIATION: DEFINITION OF THE VATER SYNDROME. *(E.)* Temtamy, S. A.; Miller, J. D. (Johns Hopkins Hosp., Baltimore, Md.). *J. Pediatr.* 85(3):345-349, 1974.

8885 CLINICAL AND ENDOSCOPIC CORRELATIONS IN GASTROINTESTINAL DISEASES. *(Rus.)* Boger, M. M.; Kocheeva, O. M.; Shmakova, T. A. (Inst. Cytol. Genet., Sib. Branch Acad. Sci., Novosibirsk, USSR). *Ter. Arkh.* 46(4):131-134, 1974.

8886 CHANGES IN THE MUCOSA OF THE ESOPHAGUS AND STOMACH IN PATIENTS WITH CHRONIC ALCOHOLISM DURING ACUTE INTOXIFICATION (DATA OBTAINED BY ENDOFIBROSCOPY AND CONTROLLED BIOPSY). *(Rus.)* Barchunov, B. N.; Kolupaev, G. P.; Kalinin, A. V.; Boguslavskaia, E. S. (no affil.). *Ter. Arkh.* 46(4):134-137, 1974.

8887 A VASOPRESSOR DOSE RESPONSE STUDY IN THE DOG WITH TRIGLYCYL LYSINE VASOPRESSIN. *(E.)* Wetterlin, S.; Ahlgren, I.; Aronsen, K. F.; Mulder, J. L. (Dept. Surg., Univ. Lund, Sweden). *Scand. J. Gastroenterol.* 9(27):17-18, 1974.

8888 ASSIMILATION OF NUTRIENTS IN DIETARY PROTEIN DEFICIENCY IN MAN. *(Rus.)* Visotskii, V. G.; Sokolov, V. N.; Agureiev, A. N. (no affil.). *Vopr. Pitan.* (4):19-24, 1974.

8889 OTA NEVUS, MULTIPLE HEMANGIOMAS, AND TAKAYASU ARTERITIS. *(E.)* Reinke, R. T.; Haber, K.; Josselson, A. (Univ. Hosp., Univ. California, San Diego). *Arch. Dermatol.* 110(3):447-450, 1974.

See also, 8404, 8413, 8446, 8449, 8466, 8467, 8468, 8470, 8494, 8517, 8710.

8890 ORIGIN OF CIRCULATING ANTIGEN FROM THE SCHISTOSOME GUT. AN IMMUNOFLUORESCENT STUDY. *(E.)* Lichtenberg, F. v.; Bawden, M. P.; Shealey, S. H. (Harvard Med. Sch., Boston, Mass.). *Am. J. Trop. Med. Hyg.* 23(6):1088-1091, 1974.

Adult *Schistosoma mansoni* males and females were obtained intact from 10-week infected Swiss white mice by portal perfusion and subjected to immunofluorescent staining with specific anti-circulating schistosome antigen (CSA) rabbit immunoglobulin plus goat anti-rabbit immunoglobulin-fluorescein conjugate. Worm sections layered with specific rabbit-anti-CSA antiglobulin reproducibly showed bright apple-green staining at all levels of the gut examined, i.e., esophagus as well as ceca. Specific fluorescence was distinct from the orange to chartreuse antifluorescence of vitellaria granules, and appeared somewhat uneven, just short of particulate. It was intense but spotty in the gut lumen and at its epithelial surface, it extended somewhat more faintly through the epithelial syncytium to its base with a sharp cutoff at the presumed level of the basement membrane. The worm tegument and parenchyma were negative. Worm sections layered with wide-spectrum mouse antiglobulin showed diffuse apple-green fluorescence throughout, most prominent in the tegument. Eggs in liver tissue remained unstained by specific anti-CSA antiglobulin, but showed the familiar bright staining of miracidia, and their envelopes, when broad-spectrum mouse antiglobulin was used. These results support the finding that CSA originates in the schistosome gut, and not in the integument. The CSA localization described does not result from a nonspecific affinity for rabbit globulins, but must be considered specific. It is suggested that the timing of the appearance of CSA (18 days) could be related to differentiation of the gut as it passes from the schistosomulum to the adult stage.

8891 TWO-YEAR FOLLOW-UP ON HYCANTHONE-TREATED Schistosomiasis mansoni PATIENTS IN ST. LUCIA. *(E.)* Cook, J. A.; Woodstock, L.; Jordan, P. (Ministry Health, Castries, St. Lucia, West Indies). *Am. J. Trop. Med. Hyg.* 23(5):910-914, 1974.

Of 433 *Schistosomiasis mansoni* patients who were treated with hycanthone (3 mg/kg i.m.), 190 were seen 2 yr after treatment and 143 of these also had follow-up examinations at 6 weeks, 6 months, and 1 yr. Visible eggs were not detected in 86% at 1 yr nor in 76% at 2 yr. The reinfection rate, as judged by a significant increase in egg excretion, was 15% at 2 yr and was related to the geographic area to which the patient returned. Total reduction in egg excretion was 98% at 1 yr and, even with reinfections, was 87% at 2 yr. At 24 months after treatment, 36 of 39 patients (92%) with hepatomegaly showed a significant decrease (>2 cm) in liver size in either the midclavicular or midsternal lines. Of 18 patients with enlarged spleens, 15 (83%) showed a decrease in organ size of 1 grade on the Hackett scale, and 1/2 of the spleens were no longer palpable. Eighteen of the patients with hepatomegaly and 11 of those with splenomegaly were aged 10-14 yr. Among patients with liver enlargement, those 15 yr or older showed less clinical response than younger patients. The number of patients does not permit statistical comparison.

8892 SERUM AND INTESTINAL FLUID IMMUNOGLOBULINS IN PATIENTS WITH GIARDIASIS. *(E.)* Jones, E. G.; Brown, W. R. (Denver VA Hosp., Colo.). *Am. J. Dig. Dis.* 19(9):791-796, 1974.

To test the possibility that immunoglobulin deficiency is a factor predisposing to symptomatic giardiasis in the general population, immunoglobulins were measured in serum and intestinal fluids of 9 giardiasis patients (8 after eradication of *Giardia lamblia*) and 12 healthy controls. The concentrations of IgG, IgA, IgM, and IgE in serum from the 2 groups and of IgA and IgM in intestinal fluids were similar. However, intestinal fluid IgG levels were significantly higher in the patients (5.8 ± 6.3 mg/100 ml) than in the controls (1.1 ± 1.9 mg/100 ml). This difference is unexplained and is of uncertain biological significance. Even though *G. lamblia* infection is very common in grossly immunoglobulin-deficient patients, giardiasis in generally healthy persons is probably not etiologically related to immunoglobulin deficiencies.

8893 THE SURVEILLANCE OF PARASITIC DISEASES IN THE UNITED STATES. *(E.)* Schultz, M. G. (Ctr. Dis. Control, Atlanta, Ga.). *Am. J. Trop. Med. Hyg.* 23(4):744-751, 1974.

8894 PROTOZOAL DISEASES ENDEMIC IN THE UNITED STATES. THE TEACHING OF PARASITOLOGY AS DETERMINED BY ENDEMIC PROTOZOAL DISEASES. *(E.)* Neva, F. A. (Natl. Inst. Allergy Infect. Dis., Bethesda, Md.). *Am. J. Trop. Med. Hyg.* 23(4):731-735, 1974.

8895 THE WORLD DISTRIBUTION OF SCHISTOSOMIASIS: SOME QUANTITATIVE ECONOMIC COMPARISONS. *(E.)* Andreano, R. L.; Helminiak, T. W.; Ho Li, J. Y. (Health Economics Res. Ctr., Univ. Wisconsin, Madison). *J. Trop. Med. Hyg.* 77(8):170-176, 1974.

8896 SCHISTOSOMIASIS IN CHICAGO: A STUDY OF THE WESTOWN PUERTO RICAN POPULATION. *(E.)* Winsberg, G. R.; Moriearty, P.; Yogore, M.; Lewert, R. (Northwestern Univ. Med. Sch., Chicago, Ill.). *Am. J. Epidemiol.* 100(4):324-332, 1974.

8897 IMMUNODIAGNOSTIC TESTS FOR SCHISTOSOMIASIS I. ANTIGEN CHARACTERIZATION AND THEIR CROSS REACTIONS. *(Ger.)* Oelerich, S.; Umaly, R. C.; Lederer, I. (Bernard Nocht Inst., Hamburg, Germany). *Tropenmed. Parasit.* 25(3):318-326, 1974.

8898 Schistosoma mansoni: IMMEDIATE HYPERSENSITIVITY TO ADULT ANTIGENS IN THE RAT. *(E.)* Vannier, W. E.; Fireman, B. I.; Chestnut, R. Y.; Murrell, K. D. (Natl. Naval Med. Ctr., Bethesda, Md.). *Exp. Parasitol.* 36(1):45-61, 1974.

8899 SINGLE AND REPEATED INFECTIONS OF GRIVET MONKEYS WITH Schistosoma mansoni: PARASITOLOGICAL AND PATHOLOGICAL OBSERVATIONS OVER A 31-MONTH PERIOD. *(E.)* Cheever, A. W.; Duvall, R. H. (Natl. Inst. Infect. Dis., Bethesda, Md.). *Am. J. Trop. Med. Hyg.* 23(5):884-894, 1974.

8900 TAPE WORM INFECTIONS OF MAN AND THEIR TREATMENT. *(Ger.)* Gonnert, R. (Inst. Parasitol. Vet. Med., Wuppertal, Germany). *Munch. Med. Wochenschr.* 116(36):1531-1538, 1974.

8901 SERUM TRANSFER OF IMMUNITY TO Fasciola hepatica IN RATS. *(E.)* Hayes, T. J.; Bailer, J.; Mitrovic, M. (Hoffmann-La Roche Inc., Nutley, N.J.). *J. Parasitol.* 60(4):722-723, 1974.

8902 PROLINE IN FACIOLIASIS: I. COMPARATIVE ACTIVITIES OF ORNITHINE-δ-TRANSAMINASE AND PROLINE OXIDASE IN FASCIOLA AND IN MAMMALIAN LIVERS. *(E.)* Ertel, J.; Isseroff, H. (Dept. Biol., SUNY Coll., Buffalo, N.Y.). *J. Parasitol.* 60(4):574-577, 1974.

8903 SEROLOGICAL STUDIES ON RODENTS INFECTED WITH Capillaria hepatica. *(E.)* Solomon, G. B.; Raybourne, R. B.; Soulsby, E. J. L. (Sch. Vet. Med., Univ. Pennsylvania, Philadelphia). *J. Parasitol.* 60(4):732-734, 1974.

8904 HISTOPATHOLOGICAL OBSERVATIONS ON RAT CAECA INFECTED WITH NON-INVASIVE AND INVASIVE STRAINS OF Entamoeba histolytica. *(E.)* Dutta, G. P.; Srivastava, R. V. N. (Centr. Drug Res. Inst., Lucknow, India). *Indian J. Med. Res.* 62(6):919-922, 1974.

8905 CHANGES IN THE LEVEL OF HYDROLYTIC ENZYMES IN THE CAECUM AND THE INTESTINE OF RATS INFECTED WITH A VIRULENT STRAIN OF Entamoeba histolytica INTRACAECALLY. *(E.)* Azhar, S.; Mukhtar, H.; Dutta, G. P.; Mohan Rao, V. K. (Cent. Drug Res. Inst., Lucknow, India). *Indian J. Med. Res.* 62(4):573-580, 1974.

8906 THERAPY OF PINWORM INFECTION. *(E.)* Shlansky, E. (Univ. Pennsylvania Sch. Med., Philadelphia). *Am. Fam. Physician* 10(5):214-215, 1974.

8907 WATERBORNE GIARDIASIS. *(E.)* Brady, P. G.; Wolfe, J. C. (Ireland Army Hosp., Fort Knox, Ky.). *Ann. Intern. Med.* 81(4):498-499, 1974.

8908 A CASE OF HUMAN STRONGYLOIDOSIS APPARENTLY CONTRACTED FROM ASYMPOMATIC COLONY DOGS. *(E.)* Georgi, J. R.; Sprinkle, C. L. (New York State Vet. Coll., Ithaca). *Am. J. Trop. Med. Hyg.* 23(5):899-901, 1974.

8909 LATENT PERIOD OF 53 YEARS IN A CASE OF HYDATID CYST DISEASE. *(E.)* Spruance, S. L. (Univ. Utah Coll. Med., Salt Lake City). *Arch. Intern. Med.* 134(4):741-742, 1974.

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8910 HL-A 27 IN CROHN'S DISEASE. *(E.)* Jacoby, R. K.; Jayson, M. I. V. (Dept. Med., Univ. Bristol, England). *Ann. Rheumatol. Dis.* 33(5):422-424, 1974.

The human leukocyte antigen (HL-A) profiles of 74 patients with Crohn's disease were investigated to determine whether those with HL-A 27 were more likely to have rheumatological disease. Of the 74 patients, 6 had HL-A 27, 3 with Crohn's disease involving the large intestine; only 16 of the 68 patients without HL-A 27 had large bowel disease. Of the 74 patients, 13 experienced periods of back pain; however, neither sacroiliitis nor ankylosing spondylitis were present in any of these 13. Limb joint symptoms were noted in 2 patients and it was possible that these were episodes of the synovitis of Crohn's disease. HL-A 27 was not present in either of these 2. Three patients had limitation of movement in the lumbar spine. The restriction was in flexion, however, and degenerative changes of the spine showed no evidence of sacroiliitis. Evidence of sacroiliitis was obtained in 3 patients, the joints had completely fused in 1 and the other 2 showed typical erosive changes. No evidence of typical ankylosing spondylitis was present and none of these 3 had HL-A 27. In 3 patients studied particularly because of known Crohn's disease and typical ankylosing spondylitis, HL-A 27 was present in only 1. Thus in this series of 74 patients with Crohn's disease, sacroiliitis was found in 3 but none had ankylosing spondylitis. Perhaps it is necessary for HL-A antigen to be present before sacroiliitis can progress to typical ankylosing spondylitis. This antigen may be useful as a genetic marker to indicate those who are susceptible to the progression of sacroiliitis to spinal involvement. The frequency of HL-A 9 was also determined and was on the same order as that found in a control population.

8911 SHORT BOWEL SYNDROME FOLLOWING RESECTION FOR CROHN'S DISEASE. *(E.)* Kristensen, M.; Lenz, K.; Nielsen, O. V.; Jarnum, S. (Rigshosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 9(6): 559-565, 1974.

Malabsorption and disability were evaluated in 28 patients (13 males and 15 females, aged 17-67 yr) who had undergone surgery for Crohn's disease. The patients was subjected to extensive intestinal resection (75 to 270 cm of small intestine) at various levels: distal ileum (17 cases, in 5 of whom an ileostomy was also performed); total ileum resection (5); jejunum plus ileum (3); and jejunum (3). In addition, a rightsided hemicolectomy was performed in 9 patients and total proctocolectomy in 1. Absorption studies were performed on the 24 patients who had not suffered recurrence at the time of the study. Steatorrhea in patients with distal ileal resection plus ileostomy (averaging 266 mM/24 hr) far exceeded that of the other groups. Abnormal bacterial growth and disturbed bile acid metabolism did not fully account for this finding. Abnormal bacterial growth was present in all 3 patients with jejunal resection, but was inconsistently present in the other groups. External pancreatic function was slightly depressed in 1/3 of the total case material. Working capacity was retained in half the patients. Two-thirds were underweight. Only 3 patients were incapacitated by diarrhea. It was concluded that an active surgical attitude to radical intestinal resection is justified in patients with extensive Crohn's disease which does not respond satisfactorily to medical treatment.

8912 PERIPHERAL BLOOD T AND B CELLS IN CHRONIC INFLAMMATORY BOWEL DISEASE. *(E.)* Strickland, R. G.; Korsmeyer, S.; Soltis, R. D.; Wilson, I. D.; Williams, Jr., R. C. (Univ. New Mexico Sch. Med., Albuquerque). *Gastroenterology* 67(4):569-577, 1974.

Proportions and absolute numbers of peripheral blood thymus-derived (T) and bone marrow-derived (B) cells were measured in 58 patients with Crohn's disease (aged 14-72 yr), and in 18 patients with chronic ulcerative colitis (aged 22-70 yr), and compared with a control population of 64 individuals. T cell proportions and numbers were significantly decreased in Crohn's disease. In chronic ulcerative colitis, T cell proportions were normal and decreased T cell numbers were related to a significantly lower than normal total peripheral blood lymphocyte count. Proportions and absolute numbers of B cells bearing surface immunoglobulin A or M were significantly increased in both Crohn's disease and chronic ulcerative colitis. The alterations in T and B cells were unrelated to disease activity, site, or duration or mode of treatment. These studies indicate that the cellular immune system may be abnormal in Crohn's disease and may be related to a quantitative defect in T cells. A deficit of peripheral blood T cells may be due to either decreased production, increased loss from the gastrointestinal tract, or sequestration in the bowel itself. These findings further emphasize the importance of peripheral blood lymphocyte abnormalities in inflammatory bowel disease.

8913 SERUM LYMPHOCYTOTOXIC AND LYMPHOCYTOPHILIC ANTIBODY ACTIVITY IN INFLAMMATORY BOWEL DISEASE. *(E.)* Korsmeyer, S.; Strickland, R. G.; Wilson, I. D.; Williams, Jr., R. C. (Univ. New Mexico Sch. Med., Albuquerque). *Gastroenterology* 67(4): 578-583, 1974.

Lymphocytotoxic activity was detected in 10 of 58 sera from patients with Crohn's disease and in 2 of 18 sera obtained from subjects with chronic ulcerative colitis. These lymphocytotoxic sera showed no clearcut human leukocyte antigen specificity and were considerably more cytotoxic for normal lymphocytes than for those obtained from Crohn's disease or chronic ulcerative colitis. No apparent relationship could be established between the presence of lymphocytotoxic activity in individual sera and the proportions or absolute numbers of peripheral blood T or B lymphocytes, or in the clinical activity of disease. Three sera from patients with Crohn's disease showed striking lymphocytophilic activity increasing 2- to 7-fold the proportions of normal peripheral blood lymphocytes bearing surface immunoglobulin (Ig) when incubated in their presence. The increment in surface Ig was shown to be principally in cell-adsorbed IgG. Two of these sera showed high degrees of lymphocytotoxic antibody as well. Two also had low absolute numbers of T lymphocytes. None of the 18 chronic ulcerative colitis patients demonstrated Ig which would bind onto normal lymphocytes.

8914 URINARY EXCRETION OF OXALATE, CALCIUM, MAGNESIUM, AND URIC ACID IN INFLAMMATORY BOWEL DISEASE. RELATIONSHIP TO UROLITHIASIS. *(E.)* Farmer, R. G.; Mir-Madulessi, S. H.; Kiser, W. S. (Cleveland Clin., Ohio). *Cleve. Clin. Q.* 41(3): 109-118, 1974.

Urinary excretion of oxalate, calcium, magnesium and uric acid was measured in 80 patients with Crohn's disease (42 men and 38 women, mean age 36.5 yr), 18 with ulcerative colitis (10 men and 8 women, mean age 41.5 yr) and 27 controls. Patients with ulcerative colitis had less urinary magnesium excretion and more calciuria than controls. Of the 80 Crohn's disease patients, 51 had ileocolic disease, 15 had disease of the small intestine, and 14 had colonic disease. Patients with ileocolic disease had significantly lower urinary calcium, magnesium, and oxalate. Those with small intestine disease had lower urinary magnesium and higher oxalate excretion when compared with patients having colonic disease, ulcerative colitis, or controls. Urinary oxalate levels reached maximum levels in patients who had ileal disease and had undergone ileal resection. Of the 98 patients with inflammatory bowel disease, 51 underwent 61 operations. Patients with ileal resection had less urinary magnesium and more urinary oxalate. Patients with ileal bypass had significantly less urinary calcium, uric acid, and magnesium values. Those with ileostomy and ileorectal anastomosis had less urinary magnesium excretion. Nine patients (6 women and 3 men, mean age 41 yr, 11%) had urolithiasis. All 9 had longstanding ileal Crohn's disease (mean 18 yr), 8 had operations, 5 had ileal resections. All but 1 had calcium stones. One, who had previously undergone ileostomy, had uric acid stones. In these 9 patients, urinary oxalate was increased and magnesium and calcium values were decreased. It was concluded that of patients with inflammatory bowel disease, those most likely to develop renal calculi have had Crohn's disease involving the ileum for a long period of time.

8915 ETIOLOGY AND EPIDEMIOLOGY OF CROHN'S DISEASE. *(E.)* Lennard-Jones, J. E. (no affil.). *Can. J. Surg.* 17(6):379-384, 1974.

8916 CLINICAL FEATURES AND PROGNOSIS OF CROHN'S DISEASE. *(E.)* McManus, J. P. (no affil.). *Can. J. Surg.* 17(6):385-391, 1974.

8917 ENDOSCOPY IN CROHN'S DISEASE. *(E.)* Devroede, G. J. (no affil.). *Can. J. Surg.* 17(6):392-393, 1974.

8918 RADIOLOGICAL FEATURES OF CROHN'S DISEASE. *(E.)* Strom, B. G. (no affil.) *Can. J. Surg.* 17(6):396-399, 1974.

8919 HISTOPATHOLOGY OF CROHN'S DISEASE. *(E.)* Leriche, M. (no affil.). *Can. J. Surg.* 17(6):393-395, 1974.

8920 PSYCHOLOGICAL MANAGEMENT OF CROHN'S DISEASE. *(E.)* Paulley, J. W. (Ipswich Hosp., England). *Practitioner* 213(1273):59-64, 1974.

8921 RECURRENT CROHN'S DISEASE. *(E.)* De Dombal, F. T. (no affil.). *Can. J. Surg.* 17(6): 408-412, 1974.

8922 MEDICAL TREATMENT OF CROHN'S DISEASE. *(E.)* Lennard-Jones, J. E. (no affil.). *Can. J. Surg.* 17(6):402-404, 1974.

8923 SURGICAL TREATMENT OF CROHN'S DISEASE. *(E.)* Weakley, F. L. (no affil.). *Can. J. Surg.* 17(6):406-408, 1974.

See also, 8549, 8556, 8584, 8644, 8694, 8848, 8850.

NUMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

GASTROENTEROLOGY ABSTRACTS and CITATIONS is published monthly and includes citations and abstracts from the biomedical world literature as they are currently received. In addition, yearly cumulated subject and author indexes are published.

This publication is available free to National Institutes of Health grantees and contractors working in the field of gastroenterology and libraries of medical schools. Requests from these qualified individuals to receive free copies of this publication must include their grant or contract number and the title of their project. These requests as well as address changes and other communications should be addressed to:

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1978.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *World Medical Periodicals*, 3rd Edition, are used.

LANGUAGE ABBREVIATIONS

Afr.	Afrikaans
Ar.	Arabic
Bul.	Bulgarian
Ch.	Chinese
Cz.	Czech
Dan.	Danish
Dut.	Dutch
E.	English
Eston.	Estonian
Fin.	Finnish
Fl.	Flemish
Fr.	French
Ger.	German
Gr.	Greek
Heb.	Hebrew
Hun.	Hungarian
Ic.	Icelandic
In.	Indonesian
It.	Italian
Jap.	Japanese
Kor.	Korean
Latv.	Latvian
Lith.	Lithuanian
Nor.	Norwegian
Pol.	Polish
Por.	Portuguese
Rum.	Rumanian
Rus.	Russian
Ser.	Serbo-Croatian
Sl.	Slovak
Sp.	Spanish
Sw.	Swedish
Th.	Thai
Turk.	Turkish
Uk.	Ukrainian
Viet.	Vietnamese

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocortitropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
ATP	adenosine triphosphate
BSP	sulfobromophthalein
C	degrees centigrade
cm	centimeter(s)
CNS	central nervous system
cpm	counts per minute
DNA	deoxyribonucleic acid
e.g.	for example
g	gram(s)
μg	microgram(s)
hr	hour(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kg	kilogram(s)
LD_{50}	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	mole(s); molar
mEq	milliequivalent(s)
mM	millimole(s); millimolar
μM	micromole(s); micromolar
mC, μC	milli-, microcurie(s)
mg	milligram(s)
min	minute(s)
ml	milliliter(s)
mm	millimeter(s)
MTD	maximum tolerated dose(s)
NAD	nicotanamide adenine dinucleotide
NADH	reduced nicotanamide adenine dinucleotide
NADP	nicotanamide adenine dinucleotide phosphate
NADPH	reduced nicotanamide adenine dinucleotide phosphate
ng	nanogram (10^{-9})
pg	picogram (10^{-12})
p.o.	orally
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

8924 ENDOCRINE-LIKE CELLS IN RAT STOMACH: EFFECTS OF 6-HYDROXYDOPA ON AMINE STORES AND AMINO ACID DECARBOXYLASE ACTIVITIES. A CHEMICAL, FLUORESCENCE HISTOCHEMICAL AND ELECTRON MICROSCOPIC STUDY. *(E.)* Hakanson, R.; Larsson, L. I.; Sundler, F. (Dept. Pharmacol., Univ. Lund, Sweden). *J. Pharmacol. Exp. Ther.* 191(1):92-101, 1974.

The mucosa of the oxyntic gland area in the rat stomach contains 2 types of endocrine-like cells belonging to an enterochromaffin-like cell system. Both cell types produce and store histamine and, if supplied with dopa, are capable of producing and storing dopamine. Treatment of male Wistar rats with 6-hydroxydopa (100 mg/kg i.p.) for 3 days caused a 10-fold increase in oxyntic histidine decarboxylase activity, without affecting histamine concentration, and more than doubled pyloric dopa decarboxylase activity. At the same time, 6-hydroxydopa treatment significantly reduced the amount of dopamine appearing in the enterochromaffin-like cells after injection of L-dopa (100 mg/kg i.p.). Electron microscopic examination of the 2 types of endocrine-like cells revealed markedly swollen granules in cells with vesicular-type granules, but no damage in cells with uniform granules. 6-Hydroxydopamine (100 mg/kg i.p.) did not produce ultrastructural changes in either type of cell. It is suggested that the enzyme-activating effect of 6-hydroxydopa is secondary to the granular damage, which in turn impairs the dopamine-storing, but not the dopamine-forming, capacity of the cells.

8925 HISTOCHEMICAL PROPERTIES OF THE ANTRAL GASTRIN CELL. *(E.)* Larsson, L. I.; Sundler, F.; Hakanson, R.; Grimelius, L.; Rehfeld, J. F.; Stadil, F. (Dept. Histol., Univ. Lund, Sweden). *J. Histochem. Cytochem.* 22(6):419-427, 1974.

The antropyloric mucosa of rat, rabbit, cat, pig, and man was investigated using certain modifications of the original Falck-Hillarp procedure (exposure of freeze-dried sections to formaldehyde gas). In rabbit, cat, pig, and man, combined formaldehyde-ozone treatment induced intense fluorescence in a large number of epithelial cells when examined under a fluorescence microscope. By subsequent treatment of the sections for immunohistochemical detection of gastrin (immunofluorescence or immunoperoxidase labeling), it could be shown that these cells were identical with the gastrin cells. The gastrin cells of cat and man could be visualized also by treatment with formaldehyde-HCl, a feature not shared with the gastrin cells of rabbit and pig. The gastrin cells in the rat antrum gave no fluorescence with either formaldehyde-ozone or formaldehyde-HCl. From histochemical model experiments and cytospectrofluorometric analyses it appears probable that the formaldehyde-ozone-induced fluorescence reflects the presence of a peptide with NH_2-terminal tryptophan. The chemical background of the fluorescence induced by formaldehyde-HCl treatment is as yet obscure. The gastrin cells of all animals studied stained with silver in the Grimelius method. Argentaffin and diazo staining as well as silver staining according to Hellerström and Hellman were carried out on sections from human antrum only. The gastrin cells were negative with these stains, but they stained with lead-hematoxylin. These properties support the view that the gastrin cells are identical with the so-called G cells.

8926 MECONIUM CORPUSCLES IN INTESTINAL EPITHELIUM OF FETAL AND NEWBORN PRIMATES. *(E.)* Ruebner, B. H.; Kanayama, R.; Bronson, R. T.; Blumenthal, S. (Sch. Med., Univ. California, Davis). *Arch. Pathol.* 98(6):396-399, 1974.

The small intestinal epithelium of fetal (1 rhesus and 2 bonnet) and newborn monkeys (19 rhesus, 11 bonnet, 6 stumptailed macaques, 5 Indian langurs, 2 sooty mangabeys, and 1 Guinea baboon) and 7 human embryos, fetuses, and neonates, all contained pigmented granules (meconium corpuscles) as demonstrated by histochemistry and light and electron microscopy. Light microscopy revealed pigmented granules in the epithelial cells of the villi tips. These were irregularly spherical, yellowish-green, and measured up to approximately 5 μ in diameter. The inclusions were also found in the lamina propria in monkeys at the tips of the villi and tended to be larger (up to 10 μ in diameter). In the youngest specimens, the pigment was predominantly epithelial while in the mature infants the pigment in the lamina propria was more pronounced. The oldest infant monkey in which the pigment was found was 14 days old. Electron microscopy showed the pigment finely granular and membrane-bound. There were no histochemical reactions for bilirubin or hemosiderin; there was, however, a positive reaction for tetrapyrrol. It was suggested, therefore, that the major part of the pigment is composed of a tetrapyrrol related to, but not identical with, bilirubin. It was also postulated that the pigment of the meconium bodies is derived from the meconium and transferred into the vascular and lymphatic circulations, possibly *via* the intercellular spaces, where some granular dense material, possibly pigment, was seen (rarely) by electron microscopy.

8927 A HISTOCHEMICAL STUDY OF THE VISCERAL ORGANS IN MALNOURISHED RAT. *(E.)* Osaki, A.; Hirohata, T.; Kumamoto, T. (Wakayama Med. Coll. Japan). *Acta Histochem. Cytochem.* 7(1):66, 1974.

8928 HISTOCHEMICAL STUDY ON NON-SPECIFIC ESTERASE ACTIVITY IN THE LIVER, KIDNEY AND SMALL INTESTINE FROM DIFFERENT MAMMALIAN SPECIES. *(E.)* Fukuda, K.; Shindo, H. (Central Res. Lab., Sankyo Co., Tokyo, Japan). *Acta Histochem. Cytochem.* 7(1): 68-69, 1974.

8929 DISSOCIATION OF RAT SUBMANDIBULAR GLAND AND LOCALIZATION OF PEROXIDASE ACTIVITY. *(E.)* Yamashina, S. (Tokyo Med. Dent. Univ., Japan). *Acta Histochem. Cytochem.* 7(1):63-64, 1974.

8930 A SCANNING ELECTRON MICROSCOPIC STUDY ON THE MURINE AND HUMAN GASTRIC MUCOSA. *(E.)* Ogata, T. (Med. Sch., Okayama Univ., Japan). *J. Electron Microsc. (Tokyo)* 23(3):227, 1974.

8931 AN IMMUNOPEROXIDASE TECHNIQUE FOR THE IDENTIFICATION OF GASTRIN-PRODUCING CELLS. *(E.)* Piris, I.; Whitehead, R. (Radcliffe Infirm., Dept. Pathol., Oxford, England). *J. Clin. Pathol.* 27(10):798-799, 1974.

8932 PERITUBULAR CELLS OF THE FUNDIC GLAND AND LOOSENING FIXATION. *(E.)* Susuki, Y.; Kusama, S. (Fac. Med., Univ. Tokyo, Japan). *J. Electron Microsc. (Tokyo)* 23(3):213, 1974.

8933 MORPHOLOGY AND HISTOCHEMISTRY OF SHORT- AND LONG-TERM RESULTS OF GASTRIC VAGOTOMY [IN CATS]. *(Rus.)* Turevskii, A. A.; Skolish, E. A. (Grodno Med. Inst., USSR). *Dokl. Akad. Nauk BSSR* 18(10):941-944, 1974.

8934 DISTRIBUTION AND PROPERTIES OF CHOLINESTERASES IN SUBCELLULAR FRACTIONS FROM RAT JEJUNUM AND HEART TISSUE. *(E.)* Das, P. K.; Sayer, K. (Dep.Biochem., Univ. Hong Kong). *Enzyme* 19(4):225-232, 1975.

8935 INHIBITORY EFFECT OF DEGRADED CARRAGEENAN ON THE FORMATION OF FASTING-INDUCED AVILLOUS LESIONS IN THE GUINEA-PIG DUODENUM. *(E.)* Poulsen, S. S.; Fenger, C. (Anat. Dept. B, Univ. Copenhagen, Denmark). *Acta Pathol. Microbiol. Scand.* [A] 82(5):623-626, 1974.

8936 SEPARATION OF LIVER CELLS BY DISCONTINUOUS ALBUMIN GRADIENT CENTRIFUGATION. *(E.)* Rojkind, M.; Portales, M. L.; Cid, M. E.; Soriano, E. (Dept. Cell. Biol., C.I.E.A., Mexico City, Mexico). *Gastroenterology* 67(4):823, 1974.

8937 VISUALIZATION OF CHARGED GROUPS ON THE SURFACE OF RAT LIVER NUCLEI. *(E.)* Virtanen, I.; Wartiovaara, J. (Univ. Helsinki, 3rd Dept. Pathol., Finland). *J. Cell Sci.* 16(3):665-675, 1974.

8938 ELECTRON MICROSCOPIC OBSERVATIONS ON THE LIVER WITH THE VARIOUS DETERGENTS. *(E.)* Sakashita, S. (Fac. Med., Mie Univ., Tsu, Japan). *J. Electron Microsc. (Tokyo)* 23(3):212, 1974.

8939 ENZYME ACTIVITIES AFTER ACROLEIN FIXATION. *(E.)* Saito, T.; Kato, H. (Dept. Morphol., Inst. Dev. Res., Kasugai, Japan). *J. Electron Microsc. (Tokyo)* 23(3):206-207, 1974.

8940 ENZYME CYTOCHEMISTRY, TRANSMISSION AND SCANNING ELECTRON MICROSCOPY OF ISOLATED BILE CANALICULI. *(E.)* Phillips, M. J.; Oda, M.; Mak, E.; Fisher, M. M. (Toronto Gen. Hosp., Canada). *Gastroenterology* 67(4):820, 1974.

8941 ULTRASTRUCTURAL LOCALIZATION OF CATALASE ON ULTRACRYOTOMIC SECTIONS OF MOUSE LIVER BY FERRITIN-CONJUGATED ANTIBODY TECHNIQUE. *(E.)* Yokota, S.; Nagata, T. (Shinshu Univ., Sch. Med., Matsumoto, Japan). *Histochemistry* 40(2):165-174, 1974.

8942 ULTRASTRUCTURAL LOCALIZATION OF NADPH CYT. C REDUCTASE ON RAT LIVER MICROSOMES USING FERRITIN CONJUGATED ANTIBODY. *(E.)* Matsuura, S.; Morimoto, T.; Sasaki, S.; Tashiro, Y.; Omura, T. (Kansai Med. Univ., Osaka, Japan). *J. Electron Microsc. (Tokyo)* 23(3):204, 1974.

8943 ULTRASTRUCTURE OF GLYCOGEN PARTICLES. *(E.)* Takeuchi, T.; Sasaki, M.; Iwamasa, T. (Kumamoto Univ. Sch. Med., Japan). *J. Electron Microsc. (Tokyo)* 23(3):219, 1974.

8944 THE STAGED SEQUENTIAL DEVELOPMENT OF THE ANUS AND RECTUM IN HUMAN EMBRYOS AND FETUSES. *(E.)* de Vries, P. A.; Friedland, G. W. (Stanford Univ. Med. Ctr., Calif.). *J. Pediatr. Surg.* 9(5):755-770, 1974.

8945 PELVIC ANATOMY. II. ANAL CANAL AND ASSOCIATED SPHINCTERS. *(E.)* Lawson, J. (St. Thomas's Hosp., Univ. London, England). *Ann. R. Coll. Surg. Engl.* 54(6):288-300, 1974.

See also, 8960, 8982, 8988, 9199, 9206, 9273, 9322, 9607.

8946 INTESTINAL ABSORPTION OF INTAKE ANTIGENIC PROTEIN.

(E.) Warshaw, A. L.; Walker, W. A. (Massachusetts Gen. Hosp., Boston). *Surgery* 76 (3):495-499, 1974.

Experiments were conducted to determine if the appearance of protein in the mesenteric lymph reflects direct and independent transport into the intestinal lymphatics or only a recirculation of protein from the portal blood. ^{3}H-Bovine serum albumin (50 mg/kg) was injected into the duodenal lumens of 6 Charles River rats prepared with cannulas in the intestinal lymphatic and portal veins. Sequential samples of portal blood and intestinal lymph were collected over a 3-hr period and assayed for ^{3}H-bovine serum albumin. Transmission of the triated bovine serum albumin into intestinal lymph and portal blood occurred regularly within the first 30 min after instillation of the labeled protein into the duodenum, with 0.76% of the administered dose appearing in the lymph and 1.11% appearing in the bloodstream during the 3-hour period. Specific activity of the intestinal lymph was unrelated to the specific activity of portal plasma over the course of the experiments, and the amount of absorption of protein into the lymph appeared to be independent of the amount absorbed into the portal blood, suggesting separate routes of absorption. The relative fractions of triated protein transmitted into the lymph *versus* the blood were unpredictable, ranging between 9-65% into the lymph. The results show that intact albumin is transported independently into both intestinal lymphatics and portal blood in the rat. This observation may help to explain the pathogenesis of numerous intestinal and systemic immune states and may be used in further studies investigating the role of local intestinal antibodies in controlling soluble antigen absorption from the small intestine.

8947 DIFFERENT EFFECTS OF HORMONAL PEPTIDES AND CYCLIC ADENOSINE 3',5'-MONOPHOSPHATE ON COLONIC TRANSPORT IN VITRO.

(E.) Yau, W. M.; Makhlouf, G. M. (Med. Coll. Virginia, Richmond). *Gastroenterology* 67(4):662-667, 1974.

The effect of various peptide hormones and other small intestinal secretory stimulants on ion and water transport by ascending and descending unfasted male albino rat colon was investigated *in vitro* with muscle-stripped everted open sac preparations. Net water flux was measured gravimetrically at 30 min intervals for 150 min, with each sac serving as its own control. Water flux rate was constant over the entire period and equal in ascending (15.6 ± 1.1 μl/hr/mg dry weight) and descending (14.9 ± 1.1) colon. Both segments responded identically to all test substances. Neither glucagon (10^{-5} M) nor pentagastrin (10^{-5} M), singly or in combination, had a significant effect on net water flux. In contrast, theophylline (10^{-5} M) and dibutyryl cyclic AMP (10^{-3} M) reduced net influx by 23% and 38%, resp. The greatest reduction was observed with ricinoleic acid (2 X 10^{-3} M) applied to the mucosal side. Changes in ionic concentration in the serosal compartment (inside the sac) at the close of the experiment and following the addition of hormonal peptides were similar to the pattern observed at the close of an initial control 60-min period. Sodium and chloride concentrations and osmolalities increased and bicarbonate concentrations decreased in both ascending and descending colon. Potassium concentration decreased in ascending and increased in the descending colon. The addition of theophylline or cyclic AMP resulted in lesser increases in serosal sodium concentration and osmolality and a greater decrease in serosal bicarbonate concentration as compared to that observed after the addition of hormonal peptides. The effects of theophylline and cyclic AMP paralleled their effect on ileal transport in other species, while the effects of hormonal peptides did not. The latter appeared to be a true species difference and was probably unrelated to the insensitivity of the distal gut to secretory stimulants.

8948 SOLUBILIZED RECEPTOR FOR INTRINSIC FACTOR-VITAMIN B_{12} COMPLEX FROM GUINEA PIG INTESTINAL MUCOSA.

(E.) Katz, M.; Cooper, B. A. (Roy. Victoria Hosp., Montreal, Canada). *J. Clin. Invest.* 54(3):733-739, 1974.

A factor that binds intrinsic factor-vitamin B_{12} complex (IF-B_{12}) was solubilized from guinea pig ileum with Triton X-100. The binding factor was soluble to the extent that it was not sedimented by centrifugation at 100,000 g for 1 hr and was small enough to enter the included volume of a Sepharose 4-B column. Furthermore, the ileal extract contained no microfine particles of membrane on electron microscope search. Following incubation of the extract with a mixture of gastric juice and ^{57}Co-labeled vitamin B_{12}, a portion of the radioactivity was excluded from a Sephadex G-200 column. When the same experiment was done with gastric juice from a patient with biologically inert intrinsic factor, radioactivity was not excluded from the gel, indicating failure of the abnormal IF-B_{12} to bind to the intestinal extract. These data suggested the presence of a specific binder of IF-B_{12} in the mucosal extract. The reactions of normal IF-B_{12} with the solubilized binding factor and with the membrane-bound receptor had several characteristics in common, including calcium dependence, temperature independence, and pH optimum near neutral. Extracts from the distal intestine were more active than those from the proximal. The solubilized binding factor appeared specific for IF-B_{12} in that it was not blocked by prior incubation with excesses of free vitamin B_{12} or intrinsic factor . Binding activity was decreased by incubation at pH 2.0, heating to 56 C, and incubation with chymotrypsin and dithiothreitol. Binding activity was unaffected by incubation with trypsin, neuraminidase, and sulfhydryl blockers. The solubilized receptor for IF-B_{12} appears to be a protein with function dependent on peptide and disulfide linkages.

8949 INTESTINAL ABSORPTION OF PEPTIDES. PEPTIDE UPTAKE BY SMALL INTESTINE OF Rana pipiens.

(E.) Cheeseman, C. I.; Parsons, D. S. (Dept. Biochem., Univ. Oxford, England). *Biochim. Biophys. Acta* 373 (3):523-526, 1974.

Uptake of glycyl-L-leucine in the small intestine of

Rana pipiens was studied with a vascularly perfused preparation. The transfer systems for L-leucine and glycine were completely saturated at the luminal concentration of 10 mM. Addition of 5 mM glycyl-L-leucine to a mixture of 10 mM L-leucine and glycine increased the rate of appearance of L-leucine in the vascular effluent by 85% and that of glycine by 210%. When dipeptide alone (5 mM) was present in the lumen, glycine transfer was increased 3-fold compared with that from 10 mM amino acid mixture. L-Leucine transfer was increased to a much smaller extent. Transfer of amino nitrogen from the dipeptide glycyl-L-leucine was not exclusively *via* the peptide transport system. Comparison of the total transfer of amino N from the peptide alone with the activity of the peptide transport system showed that the latter accounted for 60% of all amino N appearing in the vascular effluent when the dipeptide was present in the lumen. The remaining amino N must be handled by systems accessible to free amino acids in the lumen.

8950 USE OF INERT GASES AND CARBON MONOXIDE TO STUDY THE POSSIBLE INFLUENCE OF COUNTERCURRENT EXCHANGE ON PASSIVE ABSORPTION FROM THE SMALL BOWEL. *(E.)* Bond, J. H.; Levitt, D. G.; Levitt, M. D. (VA Hosp., Minneapolis, Minn.). *J. Clin. Invest.* 54(6):1259-1265, 1974.

To determine the influence of countercurrent exchange on passive absorption from the small intestine, absorption of CO, which is tightly bound to hemoglobin and cannot exchange, was compared with that of 4 unbound gases (H_2, He, CH_4, and ^{133}Xe) which should exchange freely. Absorption rates of the 5 gases were measured from closed loops of rabbit jejunum. The degree to which absorption of the unbound gases fell below that predicted from CO absorption was assumed to provide a quantitative estimate of countercurrent exchange. On the assumption that villus and central hemoglobin concentrations are equal, the flow that equilibrates with CO (F_{CO}) was calculated as 7.24 ml/min/100 g. Observed absorption rates of the unbound gases were 2-4 times greater than predicted by an equation assuming complete equilibration for these gases between lumen and F_{CO}. This was the opposite of what would occur if countercurrent exchange retarded absorption of the unbound gases. Further calculations were performed with a model that distinguishes between the flow and diffusive components of gas absorption in the rat intestine. The flow-limited fraction of the total uptake of unbound gases was still 1.8 times greater than predicted by CO absorption. A possible explanation for this discrepancy is that plasma skimming reduces villus blood hemoglobin to about 60% that of central blood. Thus, F_{CO} is about 1.7 times greater than initially calculated. With this correction factor, absorption of unbound gases predicted by CO measurements was comparable to the uptake of these gases by the equilibrating flow. Countercurrent exchange did not influence passive absorption under the conditions of this study.

8951 L-PHENYLALANINE INTERACTIONS WITH STRUCTURALLY RELATED SUBSTANCES AT THE INTESTINAL MUCOSA. *(E.)* Wapner, R. A.; Lifshitz, F. (North Shore Univ. Hosp., Manhasset, N.Y.). *Biochem. Med.* 11(4):370-375, 1974.

Interactions between L-phenylalanine and biochemically and physiologically related substances were investigated. L-Alanine, cycloleucine, and L-serine inhibited rat intestinal transport of 1 mM L-phenylalanine *in vivo* when simultaneously present in concentrations of 10 mM or more. β-2-Thienyl-DL-alanine was a more effective inhibitor even at 5 mM levels. L-Dihydroxyphenylalanine had no effect on absorption of 1 mM L-phenylalanine even when present in concentrations up to 20 mM. The data indicate that β-2-thienyl-DL-alanine may be a competitor for the specific translocation mechanism of L-phenylalanine, and that L-alanine, cycloleucine, and L-serine interfere with L-phenylalanine absorption across the intestine through the transport system common for neutral amino acids.

8952 INTERFERENCE OF ORAL IMMUNIZATION WITH THE INTESTINAL ABSORPTION OF HETEROLOGOUS ALBUMIN. *(E.)* Andre, C.; Lambert, R.; Bazin, H.; Heremans, J. F. (Edouard Herriot Hosp., Lyon, France). *Eur. J. Immunol.* 4(10):701-704, 1974.

Single 200 mg intragastric administrations of human serum albumin (HSA) were given to 15 female Wistar rats to test the effect of local immunization of the rat's intestine on subsequent digestive absorption of the antigen *in vivo*. The capacity of this group to absorb a similar intragastric test dose of HSA 2 weeks later was greatly impaired and reduced to 33, 25, and 60% of the mesenteric venous serum HSA values at 1, 2, and 3 hr, resp., measured in 15 unprimed animals receiving a 200 mg test dose of the antigen. Administration of 200 mg test doses of HSA mixed with intestinal scrapings from intragastrically immunized rats to 10 unprimed rats fasted for 24 hr also caused a decrease in intestinal absorption as compared to 10 controls receiving the antigen with nonimmune intestinal secretions. Mean mesenteric venous serum HSA values 2 hr after the test doses were 27.2 and 41.8 ng/ml, resp., in test animals and controls. These results indicate that preformed antigen-antibody complexes are denied absorption by the gut wall. The site of impairment of antigen uptake in actively immunized animals appears to be partly intraluminal, although binding of the antigen by antibody present in lamina propia fluid was not excluded as an additional factor. Radioimmunoassay HSA values were always much higher than HSA values determined with radial immunodiffusion, and the former method appeared to be interfered with by some material different from undegraded HSA. The radioimmunoassay-determined HSA value in intragastrically-primed rats 2 weeks later was equal to the value (140 μg/ml) measured by the same method in nonprimed animals 3 hr after administration of the antigen; this appears quite improbable and casts doubt on the validity of the procedure. Much of the inhibiting effect of local intragastric HSA priming appeared to be due to binding of the antigen by secreted antibody, probably immunoglobulin A, in the bowel lumen.

8953 DELINEATION OF THE DIMENSIONS AND PERMEABILITY CHARACTERISTICS OF THE TWO MAJOR DIFFUSION BARRIERS TO PASSIVE MUCOSAL UPTAKE IN THE RABBIT INTESTINE.

(E.) Westergaard, H.; Dietschy, J. M. (Univ. Texas Southwestern Med. Sch., Dallas). *J. Clin. Invest.* 54(3):718-732, 1974.

The rate of passive absorption into intestinal mucosal cells from circular pieces of the upper half of rabbit jejunum (10-15 cm in length) was determined for 2 major diffusion barriers: an unstirred water layer and the cell membrane. The unstirred water layer was resolved into 2 compartments: 1 behaving like a layer of water overlying the upper villi and the other probably consisting of solution between villi. The superficial layer was physiologically most important during uptake of highly permeable compounds and varied in thickness from 115-334 µm as the mixing rate of the bulk mucosal solution was varied. From data derived from a probe molecule whose uptake was limited by the unstirred layer, the effective surface area of this diffusion barrier also was determined to vary with stirring rate and equalled only 2.4 cm^2/100 mg in the unstirred condition; it increased to 11.3 cm^2/100 mg with vigorous mixing. This latter value, however, was still only 1/170th of the anatomical area of the microvillus membrane. These values were then used to correct the uptake rates of a number of passively absorbed probe molecules for unstirred layer resistance, and these data were in turn used to calculate the incremental free energy changes associated with uptake of specific substituent groups to the probe molecules. Permeability data for C_4-C_{12} fatty acids and C_6-C_8 alcohols 6:0 and 8:0 plotted as a log function of chain length for these molecules resulted in an average increase in the permeability coefficient by a factor of 1.52 for each methylene group added to the chain. This in turn equaled an incremental free energy change of -258 calories/M. Addition of hydroxyl group resulted in a free energy change of +564 calories/M for 4 bile acids, while substitution of the taurine group for the carboxyl function resulted in a free energy change of +1463 calories/M. In going from a secondary aldehyde group to a carboxylate anion, the free energy changed by +1162 calories/M. Thus, the unstirred layer in the intestine is rate-limiting for the mucosal uptake of compounds such as fatty acids and cholesterol. In addition, the lipid membrane of the microvillus surface appears to be relatively polar in structure.

8954 ELECTRON PROBE ANALYSIS OF CALCIUM TRANSPORT BY SMALL INTESTINE.

(E.) Warner, R. R.; Coleman, J. R. (Sch. Med. Dent., Univ. Rochester, N.Y.). *J. Cell Biol.* 64(1):54-74, 1975.

Calcium transport in small intestine of male Rochester rats and male White Leghorn chicks was studied at the cellular level with the electron probe x-ray microanalyzer. Tissues were examined directly after removal as well as after incubation in a calcium solution. In both preparations, discrete calcium localizations were found associated with intracellular and extracellular goblet cell mucus. The *in vitro* preparations showed ^{45}Ca in transit across the absorptive epithelium in discrete localizations. Although the primary path of transport was along lateral cell borders, some localizations were found in the cytoplasm in a supranuclear position. Vitamin D-deficient animals showed a decrease in the number of calcium localizations in transit across the epithelium, whereas animals given vitamin D_3 (500 IU p.o.) 72 hr before sacrifice had increased numbers of calcium localizations. The results suggest that calcium is transported while in a sequestered form and indicate that goblet cell mucus plays a role in this transport process.

8955 SODIUM TRANSPORT BY THE SMALL INTESTINE OF NEW-BORN AND SUCKLING PIGS.

(E.) Henriques de Jesus, C.; Smith, M. W. (Inst. Animal Physiol, Cambridge, England). *J. Physiol. (Lond.)* 243(1):211-224, 1974.

Sodium transport was measured across *in vitro* preparations of pig ileum taken at birth or during the 1st 10 days of postnatal life. Both the unidirectional and net fluxes of sodium fell shortly after colostrum was ingested by the newborn piglet. These changes were associated with falls in short-circuit current, open-circuit voltage and tissue conductance, and with the appearance of protein-filled vacuoles within the mucosal epithelium. Overnight fasting of piglets followed by a period of suckling caused all sodium fluxes to revert to values similar to those found in the newborn animal. The short-circuit current also increased on fasting but the magnitude of this effect decreased with age. The suckling-dependent inhibition of sodium transport was not associated with any change in the level of adenine nucleotides in the mucosa. However, the rate at which sodium entered the intestinal mucosa of suckled pigs was only 1/2 that of the newborn. Pinocytosis might use up or chemically modify the microvillar membrane, making it less permeable to sodium. Subsequent fasting would, by replenishment or further modification of existing membrane surface, allow the epithelium to recover its original permeability to sodium and possibly regain the ability to undergo a further cycle of pinocytotic activity.

8956 GALACTOSE FLUXES ACROSS BRUSH BORDER OF HAMSTER JEJUNAL EPITHELIUM: EFFECTS OF MUCOSAL ANAEROBIOSIS.

(E.) Baker, R. D.; Lo, C. S.; Nunn, A. S. (Univ. Texas Med. Branch, Galveston). *J. Membr. Biol.* 19(1/2):53-78, 1974.

Unidirectional influxes across the brush border membrane of everted hamster jejunum were determined by measuring rate of uptake during 0.5-1.0 min of incubation in 5 mM galactose. ^3H-inulin was used to correct for galactose in residual mucosal solution. Influx was greatly depressed by removing Na+ from or adding 10^{-4} phlorizin to the incubation medium. Influx was also greatly depressed by making the mucosal solution anaerobic during a 10-min preincubation period. The same severe inhibition of galactose influx by mucosal anaerobiosis also occurred under conditions in which the epithelial cells did not gain Na+. After taking into account the effect of the mucosal unstirred water layer, influxes could be normalized to a concentration of 1.0 mM at the membrane surface. At 1.0 mM the phlorizin-sensitive component of galactose influx was reduced an estimated 93% by 10 min of mucosal anaerobiosis. Unidirectional effluxes were estimated by subtracting steady-state downhill mucosal-to-serosal flux from influx. The ease of efflux was apparently augmented 2.8-fold by mucosal anaerobiosis. After 10 min of mucosal anaerobiosis, there was no longer any directional preference for movement of galactose across the brush border, nor did uphill transport occur even though a large Na+ gradient persisted. The results provide strong evidence against the theory that ion gradients provide the major source of energy for directional preference and uphill transport.

8957 EFFECTS OF CHOLERA TOXIN AND PHOSPHODIESTERASE INHIBITORS ON FLUID TRANSPORT AND CYCLIC ADENOSINE 3',5'-MONOPHOSPHATE CONCENTRATIONS IN RABBIT GALLBLADDER. *(E.)* Mertens, R. B.; Wheeler, H. O.; Mayer, S. E. (Dept. Med., Univ. California, San Diego). *Gastroenterology* 67(5): 898-906, 1974.

The effects of cholera enterotoxin on fluid transport and on mucosal cyclic AMP content were investigated in the rabbit gallbladder. Gallbladders injected intraluminally with cholera toxin (0.1 or 10 μg in Krebs-bicarbonate buffer) exhibited markedly depressed rates of fluid absorption when excised 2 hr later and studied *in vitro*. The inhibition of absorption was accompanied by a significant (approximately 3.5-fold) increase in mucosal cyclic AMP content compared with control gallbladders. There was no significant difference between the effects of 0.1 or 10 μg cholera toxin on either fluid transport or cyclic AMP content, indicating that a maximum biochemical and physiological effect was achieved with the lesser dose. The presence of theophylline (10 mM) or papaverine (0.1 mM), both phosphodiesterase inhibitors, in the solutions bathing the gallbladders also depressed fluid transport rate and increased mucosal cyclic AMP content. Fluid transport was significantly reduced by exogenous cyclic AMP (3 mM), with the effect more pronounced in the 2nd hr of study than in the 1st. Transport rates in bladders bathed in 5'-AMP (3 mM) did not differ significantly from rates observed in bladders bathed in Krebs-bicarbonate buffer alone. The transmural electrical potential difference in the rabbit gallbladder was close to 0 and was unaffected by exposure to theophylline or papaverine.

8958 PROTEIN AND GLUCOSE-INDUCED CHANGES IN SODIUM TRANSPORT ACROSS THE PIG SMALL INTESTINE. *(E.)* Henriques de Jesus, C.; Smith, M. W. (Inst. Animal Physiol., Cambridge, England). *J. Physiol. (Lond.)* 243(1):225-242, 1974.

The effect of glucose and bovine γ-globulin on short-circuit current and sodium transport was measured across newborn and suckled pig ileum. Glucose increased the short-circuit current with an apparent K_m of 1.9 and 19.5 mM for newborn and suckled intestines, resp. The V_{max} was about 80 $\mu A/cm^2$ in each case. Bovine γ-globulin (1% w/v) applied to newborn pig ileum increased sodium chloride influx by an average of 15% but did not change short-circuit current. Tissue conductance was also greater in the presence of globulin. These effects were not seen in ileum from suckled pigs. *p*-Chloromercuriphenyl sulfonic acid (PCMPS, 0.1 mM) inhibited the globulin-induced increase in sodium influx in newborn pig ileum without changing the measured short-circuit-current. PCMPS also changed the characteristics of the glucose-dependent increase in short-circuit current, so that this response came to resemble that in ileum from suckled pigs. Dithioerythritol (50 mM) reversed this effect of PCMPS. The suckling-dependent difference in results is attributed to changes in microvillar function taking place as a consequence of long-term pinocytosis *in vivo*. The ability of PCMPS to simulate some of these changes suggests that sulfhydryl groups might be important regulators of microvillar membrane stability.

8959 INTESTINAL ABSORPTION OF HEMOGLOBIN IRON-HEME CLEAVAGE BY MUCOSAL HEME OXYGENASE. *(E.)* Raffin, S. B.; Woo, C. H.; Roost, K. T.; Price, D. C.; Schmid, R. (Univ. California Sch. Med., San Francisco). *J. Clin. Invest.* 54(6):1344-1352, 1974.

Microsomes prepared from small intestinal mucosa of male Sprague-Dawley rats contain enzymatic activity similar to that of heme oxygenase in liver and spleen. The intestinal enzyme requires NADPH, is completely inhibited by 50% CO, and produced bilirubin IX-α, identified spectrophotometrically and chromatographically. Moreover, the duodenal heme oxygenase released inorganic ^{55}Fe from ^{55}Fe-heme. Enzyme activity was highest in the duodenum where hemoglobin iron absorption is reported to be most active. In iron-deficient rats, duodenal heme oxygenase activity and hemoglobin-iron absorption rose to a comparable extent. After parenteral iron repletion of iron-deficient rats, duodenal heme oxygenase activity returned to normal. In contrast to heme oxygenase, duodenal xanthine oxidase activity fell sharply in iron deficiency and rose to base line following iron repletion. These findings suggest that mucosal heme oxygenase catalyzes the cleavage of heme absorbed in the intestinal mucosa and thus plays an important role in the absorption of hemoglobin iron. The mechanisms controlling this intestinal enzyme activity and the enzyme's role in overall regulation of hemoglobin-iron absorption remain to be defined.

8960 IN VIVO EFFECTS OF Clostridium perfringens ENTEROPATHOGENIC FACTORS ON THE RAT ILEUM. *(E.)* McDonel, J. L. (Lobound Lab., Univ. Notre Dame, Indiana). *Infect. Immun.* 10(5):1156-1162, 1974.

In vivo transport and morphological responses of perfused intact rat terminal ileum (15-20 cm oral from the ilealcecal junction) to active factors from crude cell-free extracts from *Clostridium perfring-*

ens and purified enterotoxin (protein) were studied. The ileal segments were perfused at a rate of 1.7 ml/min and 2000 erythemal U/ml of the crude extract were incubated in the segments for 45 min prior to the beginning of perfusion. The crude extract induced a reversal of net transport from absorption in 7 controls to secretion of water, sodium, and chloride in 7 experimental animals. Water movement after 60 min was reversed from 0.16 ± 0.18 (controls) to -0.53 ± 0.18 μl in test animals. Chloride transport was similarly altered throughout the 60 min period, being negative (serosal to mucosal) at 15, 30, and 45 min (-125.4 ± 53.5, -87.2 ± 55.8, and -109.1 ± 21.5 nM/cm/min, resp.). Sodium transport was inconsistent in controls and experimental animals, although a substantial rate of absorption at 15 and 45 min (90.4 ± 73.0 and 84.8 ± 51.6 nM/cm/min, resp.) in controls was altered significantly to a large rate of luminal accumulation (-195.8 ± 103.6 and -119.2 ± 46.0, resp.) at comparable intervals in experimental animals. Potassium and bicarbonate were not significantly affected. Glucose transport after 60 min was reduced from 35.5 ± 4.3 nM/cm/min for 9 controls to 10.2 ± 7.0 nM/cm/min in 9 experimental animals. Crude extract also caused histological damage to the villus epithelium by denuding the villus tips, thereby leaving the lamina propria exposed. Purified toxin (160-250 erythemal U/ml) caused similar transport changes, though little histological damage resulted. The activity of the crude extract appeared to be due to the presence of the protein toxin in the extract rather than other extraneous factors, though there was little or no dependence of fluid transport response upon toxin concentration.

8961 STRUCTURE-AFFINITY RELATIONSHIPS OF SUBSTRATES FOR THE NEUTRAL AMINO ACID TRANSPORT SYSTEM IN RABBIT ILEUM. *(E.)* Preston, R. L.; Schaeffer, J. F.; Curran, P. F. (Yale Univ. Sch. Med., New Haven, Conn.). *J. Gen. Physiol.* 64(4):443-467, 1974.

The apparent affinities of various amino acids for the neutral amino acid transport system in rabbit ileum were determined by measuring the inhibition of L-methionine-^{14}C influx across the brush border of the distal ileum at methionine concentrations of 2 mM (unless otherwise noted). The apparent affinity was very low for compounds lacking an α-amino group, compounds with the α-hydrogen substituted by a methyl group, D-compounds, compounds with tertiary branching in the side chain, compounds with either a positive or negative charge in the side chain, and in most cases compounds with a hydrophilic moiety in the side chain. D-Methionine had an apparent affinity approximately 50-fold lower than L-methionine, indicating substantial preference for the L-isomer. High apparent affinities were exhibited by compounds with unbranched carbon or carbon-sulfur side chains. Amino acids with straight side chains such as norleucine and norvaline had affinities 2-2.5 times greater than the corresponding compounds with branched side chains (leucine, isoleucine, and valine). The branched compounds exhibited affinities which correlated with binding of only the linear portion of the side chain. The calculated change in free energy of binding was 370 calories/M/methylene group, suggesting that the binding region for the side chain is partially hydrophobic. Affinities of families of analogues (derivatives of cysteine, methionine, serine, alanine, valine, and phenylalanine) correlated with their calculated octanol/water partition coefficients and also with apparent structural and electronic differences between families. The neutral amino acid transport site appears to contain a region for binding the α-amino group, α-carboxyl group, and side chain. The regions about the α-amino group and α-hydrogen appear to be sterically limited. The side chain binding region is hydrophobic in nature and appears to be shallow, binding only the linear portion of branched or ring compounds.

8962 EFFECT OF EXCESS L-HISTIDINE DIET ON ACCUMULATION OF L-HISTIDINE IN ISOLATED RAT SMALL INTESTINE. *(E.)* Nakamura, Y.; Yosumoto, K.; Mitsuda, H. (Dept. Food Sci. Technol., Fac. Agr., Kyoto Univ., Japan). *J. Nutr. Sci. Vitaminol.* 20(2): 133-142, 1974.

The effects of protein deprivation and excessive administration of L-histidine on *in vitro* accumulation of L-histidine in Wistar rat small intestine were investigated with tissue strips and rings. Compared with a 20% casein diet, a nonprotein diet and a 5% casein + 5% L-histidine diet significantly enhanced the accumulation of L.-histidine/unit wet weight of the tissue strips. Endogenous L-histidine levels in the intestine of animals fed the excess L-histidine diet were much larger than in animals fed 20% casein and nonprotein diets. (0.709 *versus* 0.087 and 0.097 μM/g). Net accumulation/unit weight of the strips, calculated by taking into account the endogenous L-histidine levels, was still significantly higher for rats fed nonprotein and excess L-histidine diets. However, accumulations expressed in terms of the whole animal were identical irrespective of the dietary regimens. Also, intestinal rings from rats on different dietary regimens did not show the significant differences noted with the intestinal strips. Dietary conditions may affect intestinal absorption by modifying intestinal thickness rather than influencing the mucosal function to accumulate amino acid.

8963 VALIDATION OF A CHAMBER THAT ALLOWS MEASUREMENT OF BOTH TISSUE UPTAKE RATES AND UNSTIRRED LAYER THICKNESSES IN THE INTESTINE UNDER CONDITIONS OF CONTROLLED STIRRING. *(E.)* Lukie, B. E.; Westergaard, H.; Dietschy, J. M. (Univ. Texas Health Sci. Ctr., Dallas). *Gastroenterology* 67(4): 652-661, 1974.

An incubation chamber allowing measurement of both unstirred layer thicknesses and tissue uptake rates under identical conditions and with provision for systematically and reproducibly varying the rate of stirring is described in addition to validation studies on albino rabbit jejunum slices (10-20 cm of the proximal portion). The intestinal specimen is mounted between a circular platform and a retaining lid, with the mucosal surface of the intestine exposed to the mucosal incubation solution through an aperture in the retaining lid (1 cm in diameter). The height of tissue above the magnetic stirring bar in an incubation beaker can be varied by sliding a central cylinder upward or downward in a supporting lid. The stirring rate is varied by changing the rotation rate of the magnetic stirrer. At a stirring rate of 500 revolutions/min, the mean thickness of the diffusion barrier in rabbit jejunum was approximately 150 µm. Use of a marker of adherent mucosal fluid volume was of critical importance in obtaining reliable transport data, particularly when studying poorly permeant solutes or solutes solubilized in bile acid micelles. The presence of intestinal mucus or bile acids in the incubation solution increased the volume of the adherent mucosal fluid which was shown to represent a true increase in the volume of the extracellular incubation fluid trapped on the tissue. At least 3-6 min were required to fully equilibrate the unstirred layers with marker compounds such as dextran or inulin which were used for calculating the adherent mucosal fluid volume. Incubations of more than 10 min led to loss of solute molecules into the serosal compartment. Incubation times of 6-10 min gave the most reliable uptake rate measurements in the chamber. Active and passive transport studies with glucose and saturated fatty acids 8:0 and 10:0, resp., showed a linear glucose active uptake with respect to time for at least 10 min and linear passive uptake of octanoate for up to 8 min. Glucose active uptake displayed an apparent hyperbolic relation to glucose concentration in incubation medium in contrast to the linear passive uptake of fatty acids with respect to their concentrations.

8964 GASTRO-INTESTINAL ABSORPTION AND TOXICOLOGY: INGESTA-EXCHANGE AND SIMULATED-MEAL TECHNIQUES. *(E.)* Pekas, J. C. (Agric. Res. Service, US Dept. Agric. Fargo, N.D.). *Food Cosmet. Toxicol.* 12(3):351-357, 1974.

8965 MICROELECTRODE STUDIES OF FUNDIC GASTRIC MUCOSA: CELLULAR COUPLING AND SHUNT CONDUCTANCE. *(E.)* Spenney, J. G.; Shoemaker, R. L.; Sachs, G. (Dept. Med. Physiol., Univ. Alabama, Birmingham). *J. Membr. Biol.* 19(1/2):105-128, 1974.

8966 ACTIVE TRANSPORT AND ATP IN FROG GASTRIC MUCOSA. *(E.)* Durbin, R. P.; Michelangeli, F.; Nickel, A. (Cardiovascular Res. Inst., Univ. California, San Francisco). *Biochem. Biophys. Acta* 367(2):177-189, 1974.

8967 EFFECTS OF ETHANOL ON PERMEABILITY AND TRANSPORT IN DOG GASTRIC MUCOSA IN VITRO. *(E.)* Kuo, Y. J.; Shanbour, L. L.; Sernka, T. J. (Univ. Texas Med. Sch., Houston). *Tex. Rep. Biol. Med.* 32(2):588, 1974.

8968 INTESTINAL ABSORPTION—THE MAJOR DETERMINANT OF SERUM BILE ACIDS IN PATIENTS WITH NORMAL LIVER FUNCTION. *(E.)* La Russo, N. F.; Korman, M. G.; Hoffman, N. E.; Hofmann, A. F. (Mayo Clin., Rochester, Minn.). *Gastroenterology* 67(4): 806, 1974.

8969 THE QUESTION OF COUNTER-TRANSPORT IN THE INTESTINE. *(E.)* Robinson, J. W. L. (Cantonal Univ. Hosp., Lausanne, Switzerland). *Biochem. Biophys. Acta* 367(1):98-101, 1974.

8970 TRANSFER OF SODIUM AND WATER THROUGH THE ISOLATED COLONIC MUCOSA AS A FUNCTION OF THE HYDROSTATIC PRESSURE (HP) UNDER THE INFLUENCE OF OXYPHENISATIN (OI). *(E.)* Wanitschke, R.; Nell, G. (Dept. Pharmacol., Univ. Saarland, Homburg, Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 282(Suppl.): R104, 1974.

8971 METABOLIC PROPERTIES OF NEONATAL TRANSPORT. *(E.)* Ferdinandus, L. D.; Fitzgerald, J. F.; Reiser, S. (Indiana Univ. Sch. Med., Indianapolis). *Pediatr. Res.* 8(11):884-889, 1974.

8972 INFLUENCE OF OVINE PROLACTIN ON TRANSPORT OF FLUID AND SODIUM CHLORIDE BY THE MAMMALIAN INTESTINE AND GALL BLADDER. *(E.)* Mainoya, J. R.; Bern, H. A.; Regan, J. W. (Dept. Cancer Res., Univ. California, Berkley). *J. Endocrinol.* 63(2): 311-317, 1974.

8973 GLUCOSE ABSORPTION FROM THE RAT JEJUNUM DURING ACUTE EXPOSURE TO METFORMIN AND PHENFORMIN. *(E.)* Coupar, I. M.; McColl, I. (Dept. Physiol., Monash Univ., Clayton, Australia). *J. Pharm. Pharmacol.* 26(12):997-998, 1974.

8974 TRANSMISSION OF PAROTIN THROUGH THE SACS OF EVERTED INTESTINE AND ITS DEMONSTRATION IN MESENTERIC PERFUSATE. *(E.)* Moriwaki, C.; Yamaguchi, K.; Miyazaki, K. (Fac. Pharm. Sci., Sci. Univ. Tokyo, Japan). *Endocrinol. Jap.* 21(2):93-99, 1974.

8975 INFLUENCE OF MAO-INHIBITORS ON THE INTESTINAL ABSORPTION OF BIOGENIC AMINES. *(E.)* Huebers, H.; Huebers, E.; Huebers, U.; Rummel, W. (Dept. Pharmacol., Univ. Saarland, Homburg, Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 282(Suppl.): R36, 1974.

8976 UPTAKE OF ALBUMIN BY NEONATAL PIG ILEUM INCUBATED IN VITRO. *(E.)* Munn, E. A.; Smith, M. W. (A.R.C. Inst. Animal Physiol., Cambridge, England). *J. Physiol. (Lond.)* 242(2):30-32, 1974.

8977 FURTHER DATA ON THE AGE-DEPENDENT INTESTINAL ABSORPTION OF DIBASIC AMINO ACIDS. *(E.)* Penzes, L. (Univ. Med., Budapest, Hungary). *Exp. Gerontol.* 9(5/6):259-262, 1974.

8978 HIGH AFFINITY TRANSPORT OF CHOLINE INTO THE MYENTERIC PLEXUS OF GUINEA-PIG INTESTINE. *(E.)* Pert, C. B.; Snyder, S. H. (Johns Hopkins Univ. Sch. Med., Baltimore, Md.). *J. Pharmacol. Exp. Ther.* 191(1):102-108, 1974.

8979 MECHANISTIC STUDIES ON EFFECT OF CHOLATE CONCENTRATION ON CHOLESTEROL UPTAKE BY ISOLATED RABBIT INTESTINE. *(E.)* Bikhazi, A. B.; Hajjar, J. J. (Sch. Pharm., American Univ., Beirut, Lebanon). *J. Pharm. Sci.* 63(11):1703-1707, 1974.

8980 ROLE OF THE THYROID GLAND IN BLOOD CALCIUM HOMEOSTASIS DURING INTESTINAL CALCIUM ABSORPTION IN MAN. *(E.)* Coen, G.; Mazzuoli, G. F.; Antonozzi, I.; Scarda, A. (2nd Med. Clin., Univ. Rome, Italy). *Metabolism* 23(8):709-714, 1974.

8981 GOSSYPOL LOCKS UP THE IRON. *(E.)* Herman, D. L.; Smith, F. H. (no affil.). *Food Cosmet. Toxicol.* 12(4):585, 1974.

8982 INFLUENCE OF CHEMICAL STRUCTURE ON HEPATIC UPTAKE OF BILE SALTS. *(E.)* Paumgartner, G.; Reichen, J. (Dept. Clin. Pharmacol., Univ. Berne, Switzerland). *Gastroenterology* 67(4):819, 1974.

8983 RATIOS OF POLYUNSATURATED FATTY ACIDS TO α-TOCOPHEROL IN TISSUES OF RATS FED CORN SOYBEAN OILS. *(E.)* Poukka Evarts, R.; Bieri, J. G. (Natl. Inst. Arthritis, Metab., Dig. Dis., Bethesda, Md.). *Lipids* 9(11):860-864, 1974.

8984 TRANSPORT MECHANISMS OF β-LACTAM ANTIBIOTICS ACROSS EVERTED RAT GUT. *(E.)* Penzotti, Jr., S. C.; Poole, J. W. (Wyeth Lab., Radnor, Pa.). *J. Pharm. Sci.* 63(11):1803-1806, 1974.

8985 THE VIABILITY OF THE VASCULARLY PERFUSED JEJUNAL LOOP OF THE RAT AND ITS SIGNIFICANCE FOR THE DRUG ABSORPTION. *(E.)* Ochsenfahrt, H. (Pharmacol. Inst., Univ. Tubingen, Germany). *Naunyn Schiedebergs Arch. Pharmacol.* 282(Suppl.):R71, 1974.

8986 STUDIES ON THE ABSORPTION AND METABOLISM OF RUTOSIDES. *(E.)* Forster, H.; Harth, P. (Biol. Chem. Ctr., Univ. Frankfurt, Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 282(Suppl.):R21, 1974.

8987 HEPATOCELLULAR UPTAKE OF BILE ACIDS: FURTHER EVIDENCE FOR A CARRIER-MEDIATED TRANSPORT SYSTEM. *(E.)* Glasinovic, J. C.; Dumont, M.; Duval, M.; Erlinger, S. (INSERM,Beaujon Hosp., Clichy, France). *Digestion* 10(4/5):323-324, 1974.

8988 DEPENDENCE OF HEPATIC UPTAKE ON CHEMICAL STRUCTURE AND CONJUGATION OF BILE SALTS. *(E.)* Reichen, J.; Paumgartner, G. (Dept. Clin. Pharmacol., Univ. Berne, Switzerland). *Digestion* 10(4/5):313, 1974.

8989 THE IONIC DEPENDENCE OF CELL MEMBRANE POTENTIAL AND RESISTANCE IN MOUSE LIVER AND THE EFFECTS OF CHOLIC ACID. *(E.)* Graf, J. (Inst. Med. Physiol. C, Univ. Copenhagen, Denmark). *Digestion* 10(4/5):352, 1974.

8990 DIFFERENT PATHWAYS FOR HEPATIC UPTAKE OF TAUROCHOLATE AND INDOCYANINE GREEN. *(E.)* Paumgartner, G.; Reichen, J. (Dept. Clin Pharmacol., Univ. Berne, Switzerland). *Gastroenterology* 67(4):818, 1974.

8991 BILE ACID INTERACTIONS WITH A SPECIFIC RECEPTOR IN LIVER PLASMA MEMBRANES. *(E.)* Accatino, L.; Simon, F. R. (Univ. Colorado Med. Ctr., Denver). *Gastroenterology* 67(4):778, 1974.

8992 HEPATIC ORGANIC ANION UPTAKE IN THE RAT. *(E.)* Scharschmidt, B. F.; Waggoner, J. G.; Vergalla, J.; Berk, P. D. (Natl. Inst. Arthritis, Metab. Dig. Dis., Bethesda, Md.). *Gastroenterology* 67(4):827, 1974.

8993 LIVER UPTAKE OF CHOLEPHILIC ANIONS MAY BE INDEPENDENT OF Y PROTEIN. *(E.)* Berthelot, P.; Preaux, A. M.; Arondel, J.; Dhumeaux, D. (INSERM, Henri Mondor Hosp., Creteil, France). *Digestion* 10(4/5):336, 1974.

8994 FACTORS INFLUENCING FREE FATTY ACID UPTAKE BY THE ISOLATED PERFUSED RAT LIVER. *(E.)* Soler-Argilaga, C.; Infante, R.; Renaud, G.; Polonovski, J. (Hepatol. Res. Unit, INSERM, Paris, France). *Biochimie* 56(5):757-761, 1974.

8995 CONTROL OF BSP UPTAKE IN ISOLATED LIVER CELLS BY THE CALCIUM CONTENT OF THE PLASMA MEMBRANE. *(E.)* Baur, H. (Dept. Toxicol., Univ. Tubingen, Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 282(Suppl.):R5, 1974.

8996 ACUTE EFFECT OF ORAL ETHANOL INTAKE ON THE RATE OF BROMOSULPHTHALEIN (BSP) TRANSPORT IN HEALTHY HUMANS. *(E.)* Safavi, S. S.; Raichlen, J. S.; Weiss, J. B.; Long, W. B.; Marin, G. A. (Philadelphia Gen. Hosp., Pa.). *Gastroenterology* 67(4):825, 1974.

8997 THE EFFECT OF RIFAMPICIN ON HEPATIC TRANSPORT FUNCTION:-AS DETERMINED BY INFUSIONS OF UNCONJUGATED BSP. *(E.)* Whelan, G. (Dept. Med., Univ. Melbourne, Australia). *Gastroenterology* 67(4):836, 1974.

ABSORPTION—EXCRETION—TRANSPORT

8998 INFLUENCE OF THE FATTY ACID COMPOSITION OF THE DIETARY FATS ON BILE FLOW, TRANSPORT CAPACITY OF BILE ACIDS IN THE ENTEROHEPATIC CIRCULATION AND CHOLESTEROL-7α-HYDROXYLASE ACTIVITY IN RATS FED DIVERSE FAT DIETS. *(E.)* Mayer, G.; Mayer, D. (Med. Coll., Hannover, Germany). *Digestion* 10 (4/5):367, 1974.

See also, 9128, 9183, 9185, 9217.

MOTILITY

8999 EFFECT OF CHANGE OF POSITION ON THE FUNCTION OF THE CANINE LOWER ESOPHAGEAL SPHINCTER. *(E.)* Khan, T. A.; Crispin, J. S.; Lind, J. F. (Deer Lodge Hosp., Winnipeg, Canada). *Gastroenterology* 67(5):957-964, 1974.

A study was done to determine the influence of intrathoracic displacement on the function of the lower esophageal sphincter and to determine how gastroesophageal competence is restored by operations that replace the lower esophageal sphincter below the diaphragm. Sphincter function was studied manometrically and cinefluorographically in 23 dogs, under resting conditions and during abdominal compression. Vagotomy at the canine gastroesophageal junction resulted in a decrease in resting intraluminal pressure at the lower esophageal sphincter, and in the pressure response of the sphincter to abdominal compression. When the vagotomized lower esophageal sphincter was displaced into the chest, pressures decreased further and the sphincter became incompetent. Replacement of the vagotomized sphincter below the diaphragm (Allison repair) improved resting lower esophageal sphincter pressure but did not restore competence in all animals. Fundic-wrap combined with abdominal replacement of the lower esophageal sphincter (modified Belsey procedure) was most effective in restoring competence and this was associated with increases both in resting lower esophageal sphincter pressure and in the response to compression. Recovery of the sphincter response to compression was associated with downward displacement of the lower esophageal sphincter into the abdomen and elongation of the high pressure zone.

9000 CIRCADIAN RHYTHMICITY OF THE INTESTINAL TRANSIT IN RATS AND ITS DISTURBANCE THROUGH EXPERIMENTAL HYPERTHYROIDISM. *(E.)* Triantaphyllidis, H.; Bader, J. P. (Henri Mondor Hosp., Creteil, France). *Scand. J. Gastroenterol.* 9(5):487-494, 1974.

Intestinal transit time was studied in male Wistar rats rendered hyperthyroid either by ingestion of thyroxin (40 µg of dl-T_4) in food or by injection of 200 µg of dl-T_4 3 or 4 times/week. Transit time was measured by following the appearance of radioactivity in the stools following gastric intubation of either ^{51}Cr-chloride or ^{206}Bi-subnitrate. The control euthyroid rats demonstrated a circadian rhythm with respect to transit time which was significantly shorter when markers were given at 4 p.m. than at either 10 a.m. or midnight. The rhythm was upset in hyperthroid rats with the difference in transit time for markers given at 4 p.m. and 10 a.m. only 20-25% rather than 50% as in the controls. Although the total weight of feces eliminated was about the same for hyperthyroid as for control rats, the pattern of elimination differed significantly. Control rats eliminated most frequently between 6 p.m. and 7 a.m. with almost no elimination between 10 a.m. and 5 p.m., while hyperthyroid rats showed no such diurnal pattern.

9001 A STUDY OF PACE-MAKER ACTIVITY IN INTESTINAL SMOOTH MUSCLE. *(E.)* Connor, J. A.; Prosser, C. L.; Weems, W. A. (Dept. Physiol. Biophys., Univ. Illinois, Urbana). *J. Physiol. (Lond.)* 240:671-701, 1974.

Electrical activity of longitudinal muscle from cat duodenum was recorded in the double sucrose gap. Approximately 20% of the preparations demonstrated spontaneous slow waves; this activity, although quite uniform in a given preparation, showed considerable inter-preparation variation with respect to amplitude, frequency, and wave-form. Application of a steady hyperpolarizing current decreased slow-wave frequency and increased slow-wave amplitude while depolarizing currents increased frequency and decreased amplitude. In some quiescent preparations, membrane hyperpolarization induced slow waves 10-40 mV. Step or ramp depolarization of the membrane from hyperpolarized levels triggered slow waves in some preparations. Conductance changes during the course of a slow wave were observed with current or voltage clamp techniques. The slow-wave amplitude and time course were simulated by applying the membrane current measured under voltage clamp to the passive membrane resistance and capacitance measured independently under current clamp. Ouabain (10^{-5}) irreversibly blocked slow waves and produced a membrane depolarization equal to or slightly greater than the slow wave crest. Removal of external potassium produced a reversible sequence of events almost identical to those following ouabain application. Replacement of 50% of the external sodium chloride with sucrose produced no changes in slow-wave activity with respect to rates of rise or fall, maximum amplitude or frequency. Sucrose replacement of all external sodium chloride eliminated slow waves after 5 min; however, activity was restored by a slight hyperpolarization. Long exposures to the modified bath abolished activity. Following a conditioning exposure to potassium-free Krebs solution, readmission of potassium at normal concentrations resulted in a mean hyperpolarization of 20.5 mV and an arrest of spontaneous slow wave activity. Pump current in sodium-loaded, nonspontaneous preparations was voltage dependent. The results indicate that an electrogenic pump is present in longitudinal muscle of cat duodenum, and that oscillations in the level of pump current produce slow waves.

9002 EFFECT OF ESOPHAGEAL MOVEMENT ON INTRALUMINAL ESOPHAGEAL PRESSURE RECORDING. *(E.)*

Dodds, W. J.; Stewart, E. T.; Hogan, W. J.; Stef, J. J.; Arndorfer, R. C. (Med. Coll. Wisconsin, Milwaukee). *Gastroenterology* 67(4):592-600, 1974.

The relative movements of the esophageal lumen and the intraesophageal manometric recording site were studied and the resulting effect on intraluminal esophageal pressure recordings was assessed in 6 cats. To this end, the esophageal body, lower esophageal sphincter and diaphragmatic hiatus, as well as the recording orifice of the manometric tube, were labeled with metal markers, and cineroentgenograms and intraluminal esophageal pressure tracings were obtained simultaneously during respiration, peristalsis and abdominal compression. Esophageal movement relative to the manometric recording tips occurred under all experimental conditions. Evidence exists which indicates that the human esophagus moves similarly. The lower esophageal sphincter was found to move orad on expiration and aborad on inspiration, resulting in associated changes in the pressure recording from sensors anchored in the sphincter. These pressure oscillations are synchronous with respiration and rather than representing superimposed thoracic or abdominal pressure they reflect movement of the sphincter pressure profile relative to the recording tip. The pressure inversion point under these circumstances represents the peak and either shoulder of the lower esophageal pressure distribution curve rather than the interface between abdominal and thoracic cavity pressure influences. Thus, with respect to humans, the apparent peak resting lower esophageal pressure as determined by the conventional pull-through technique cannot be measured with accuracy since the pressure oscillations obtained during pull-through represent primarily an "artifact" due to motion rather than a real change in lower esophageal sphincter pressure *per se*.

9003 DESENSITISATION AND AGONIST BINDING TO CHOLINERGIC RECEPTORS IN INTESTINAL SMOOTH MUSCLE. *(E.)*

Young, J. M. (Univ. Cambridge Med. Sch., England). *FEBS Lett.* 46(1):354-356, 1974.

The effects of various muscarinic agonists and antagonists on the binding of ^{3}H-labeled propylbenzilylcholine mustard (^{3}H-PrBCM) to guinea pig small intestinal longitidinal muscle were studied *in vitro*. Preincubation of muscle strips in either agonists (acetylcholine, carbachol, hexyltrimethylammonium, (+)-acetyl-β-methacholine) or antagonists (atropine, methylatropinium, propylbenzilylcholine) produced an 85% inhibition in ^{3}H-PrBCM binding. Unlike the antagonists, which yielded binding curves with a Hill slope of essentially 1.0 consistent with a simple mass-action equilibrium, all the agonists yielded curves with mean Hill slopes of about 0.5. The fact that the shape of the inhibition curve for one of the agonists, carbachol, was not significantly altered but was shifted to the left suggested that the apparent negative cooperativity might be secondary to receptor desensitization. Recovery from desensitization, as measured by the rate of recovery of the contractile response to carbachol, was slow. Prior desensitization by higher concentrations of carbachol (10^{-4} M) led to only a small and statistically insignificant decrease in ^{3}H-PrBCM binding. The inhibition curve for carbachol, however, was steeper (Hill coefficient = 0.90-0.21) and shifted to the right suggesting that desensitization of muscarinic acetylcholine receptors in guinea pig longitudinal intestinal muscle is associated with a change in receptor conformation.

9004 A MATHEMATICAL MODEL OF THE SLOW-WAVE ELECTRICAL ACTIVITY OF THE HUMAN SMALL INTESTINE. *(E.)*

Robertson-Dunn, B.; Linkens, D. A. (Dept. Control Eng., Univ. Sheffield, England). *Med. Biol. Eng.* 12(6):750-757, 1974.

A mathematical model has been developed, using available data from human and dog experiments, for slow-wave electrical activity in human and dog small intestine. It comprises an interconnected chain of 100 Van der Pol relaxation oscillators programmed on a digital computer. The method of coupling and magnitude were chosen so that known small intestinal phenomena are reproduced. The oscillator chain shows a varying frequency gradient which agrees with the concept of a series of short frequency plateaus along the small intestine giving a stepwise gradient like that previously reported in living small intestine. The frequency plateau and time-dependent phase shifts in the upper part of the model correspond to the human duodenum. The distal oscillators did not exhibit fixed frequency plateaus, thus agreeing with data from animal experiments as well as with results from studies made on 2 sites in the terminal ileum in man. Simulation of a transection of the small intestine by cutting of the oscillator chain at a single point results in decreased impulse frequency in the oscillators below the cut as well as formation of a plateau at a frequency greater than the intrinsic frequency of the first oscillator below the cut. The oscillators with the decreased frequencies tended to have an inphase relationship.

9005 REGENERATION OF THE SMOOTH-MUSCLE CELLS, A STRUCTURAL BASIS FOR RESTORATION OF THE SLOW-POTENTIAL RHYTHM IN THE DISTAL PART OF THE STOMACH AFTER TRANSECTION. *(E.)*

Atanassova, E.; Jurukova, Z.; Zacheva, I. (Inst. Physiol., Bulgarian Acad. Sci., Sofia). *J. Physiol. (Paris)* 68(3):291-304, 1974.

Smooth muscle regeneration and restoration of muscle wall bioelectrical activity were studied in 16 male and female dogs following gastric transection with immediate end-to-end anastomosis at the level of the *incisura angularis*. Silver ball-shaped, subserously implanted electrodes were used to record bioelectrical activity from the muscle wall of the stomach above and below the anastomosis. During the first few days after surgery, a considerable decrease of the frequency of the slow potentials in the distal segment of the stomach was observed. On the other hand, the slow-potential rhythm in the proximal segment remained unchanged. On about the 5th day there appeared short periods of acceleration of slow potentials from the stomach below the anastomosis. From the 6th to the 10th day, the accelerated rhythm of the distal segment became constant and identical to that of the proximal segment. At different periods after the surgery tissue samples were taken from the area of anastomosis for histologic examination. Evidence for regeneration of the smooth muscle cells in the longitudinal muscle layer was indicated on the 6th day by the presence of single smooth muscle cells; on the 9th day, by groups of cells; on the 12th day, by sheaves of cells; and, at the end of the first month, by solid bridges of cells passing across the anastomosis. That the regenerated cells were indeed smooth muscle cells was shown by electron-microscopic examination.

9006 NEURAL CONTROL OF THE LOWER ESOPHAGEAL SPHINCTER: INFLUENCE OF THE VAGUS NERVES.

(E.) Rattan, S.; Goyal, R. K. (Baylor Coll. Med., Houston, Tex.). *J. Clin. Invest.* 54(4):899-906, 1974.

Studies were conducted to determine the influence of vagal stimulation on the control of lower esophageal sphincter function in the opossum. Bilateral vagotomy resulted in transient sphincter hypertension, which was prevented by pretreatment with phentolamine (1 mg/kg) or atropine (30 μg/kg). Electrical stimulation of the peripheral vagi following vagotomy caused relaxation which was less marked at lower frequencies and which was not enhanced by atropine. Additional experiments showed that atropine could reverse the rise in gastric (fundic) pressure caused by vagal stimulation although it could not concomitantly enhance sphincter relaxation. Electrical stimulation of the central vagi following bilateral vagotomy caused an increase in lower esophageal sphincter pressure which was significantly antagonized by subsequent atropine or phentolamine treatment. These studies indicate that the vagi carry purely inhibitory efferents to the lower esophageal sphincter and that they also carry afferent fibers for a centrally mediated reflex lower esophageal sphincter contraction. The increased sphincter tone resulting from vagal stimulation is due to a centrally mediated reflex, the efferents of which are not vagal since the reflex sphincter contraction presisted after bilateral vagotomy.

9007 STRUCTURE-ACTIVITY RELATIONSHIP OF SOME ANALOGUES OF GASTRIN AND CHOLECYSTOKININ ON INTESTINAL SMOOTH MUSCLE OF THE GUINEA-PIG.

(E.) Vizi, E. S.; Bertaccini, G.; Impicciatore, M.; Mantovani, P.; Zseli, J.; Knoll, J. (Semmelweis Univ. Med., Budapest, Hungary). *Naunyn Schmiedebergs Arch. Pharmacol.* 284(3):233-243, 1974.

The effect of various synthetic gastrin- and cholecystokinin-like polypeptides on contraction of the longitudinal and circular muscle layer of guinea pig ileum was studied *in vitro*. Circular muscle contractions were measured by the change in intraluminal pressure and longitudinal muscle contractions were quantitated by measuring the length of shortening of the gut following electrical stimulation. All substances tested (including human gastrin I, gastrin-II-hexapeptide, cerulein, cholecystokinin or octapeptide and cholecystokinin-pancreozymin) produced an initial increase in tension of longitudinal muscle followed by contraction of the circular muscle layer with concomitant relaxation of the longitudinal layer. This pattern was inhibited by tetrodotoxin (10^{-6} M). Hexamethonium (8.2×10^{-4}M) prevented response to the polypeptides of the circular layer, suggesting that at least 1 ganglion is involved in the nervous pathway leading to the circular muscle. Studies conducted on isolated longitudinal ileal muscle layers showed that the effect of the polypeptides is dose-dependent. Structure-activity studies indicate that the presence of tyrosine-O-sulfate is important for effective interaction between the peptides and the peptide-sensitive receptors of the ganglion cells of Auerbach's plexus. Application of the polypeptides in concentrations 2-3 times their maximally effective concentrations produced tachyphylaxis.

9008 TOPICAL DIFFERENCES OF CAFFEINE ACTION ON THE SMOOTH MUSCLE CELLS OF THE GUINEA PIG ALIMENTARY CANAL.

(E.) Ito, Y.; Osa, T.; Kuriyama, H. (Fac. Dent., Kyushu Univ, Fukuoka, Japan). *Jap. J. Physiol.* 24(2):217-232, 1973.

The effects of caffeine (5 mM) on the electrical and mechanical properties of the smooth muscle of various parts of the guinea pig alimentary canal were investigated. Caffeine produced contracture in the circular muscle of the stomach and the longitudinal muscle of the ileum, jejunum, cecum (taenia coli), and rectum. In the presence of caffeine, regular contractions ceased in the stomach and taenia coli but increased in the ileum, jejunum, and rectum. Caffeine completely eliminated the generation of the tonic response and suppressed the phasic response of K-induced contracture in all regions of the alimentary canal. In the stomach caffeine reduced the amplitude of slow waves and frequency of spike discharges, without affecting membrane potential and membrane resistance. Slow wave activity of the stomach muscle was suppressed in Na-free (tris), Ca-free, and Cl-deficient (NO_2) solutions, while the frequency of the slow wave was increased in Cl-deficient (Br) solution. Caffeine produced contracture in all these solutions without any marked change of the membrane potential or resistance. Caffeine depolarized the membrane in the ileum, taenia, and rectum and enhanced spike amplitude and frequency in the ileum and rectum. Membrane resistance decreased in the taenia coli and rectum, but increased or did not change in the ileum. ATP (5mM) and theophylline (5 mM) suppressed slow wave activity in the stomach; theophylline, but not ATP, induced contracture. If caffeine mobilizes Ca ion and increases free Ca in the myoplasm, this mobilization may be closely re-

ted to the K channel in the small intestine and
e Na channel in the large intestine. From the
sults it is concluded that topical differences
ionic permeability in the alimentary canal are a
sult of Ca release from the sequestered sites.

09 ACTION OF BOMBESIN ON HUMAN GASTROINTESTINAL MOTILITY. *(E.)* Bertaccini, G.;
picciatore, M.; Molina, E.; Zappia, L. (Dept.
armacol., Univ. Parma, Italy). *Rend. Gastroenterol.*
1):45-51, 1974.

10 EFFECTS OF BOMBESIN ON THE MECHANICAL ACTIVITY OF THE HUMAN DUODENUM AND JEJUNUM.
.) Corazziari, E.; Torsoli, A.; Delle Fave, G. F.;
lchiorri, P.; Habib, F. I. (2nd Med. Clin., Univ.
me, Italy). *Rend. Gastroenterol.* 6(1):55-59, 1974.

11 EFFECT OF BOMBESIN ON HUMAN GALLBLADDER EMPTYING. *(E.)* Corazziari, E.; Torsoli,
.; Melchiorri, P.; Delle Fave, G. F. (2nd Med. Clin.,
iv. Rome, Italy). *Rend. Gastroenterol.* 6(1):52-
, 1974.

12 EVIDENCE THAT SUBSTANCES CAPABLE OF INCREASING THE DUODENAL CONTENT EXERT A SPAS-
GENIC EFFECT ON THE PYLORUS. *(E.)* Impicciatore,
. (Dept. Pharmacol., Univ. Parma, Italy). *Br. J.
harmacol.* 52(3):467P-468P, 1974.

9013 ANTAGONISM OF MORPHINE INTESTINAL CONTRACTIONS BY DRUGS WHICH INCREASE TISSUE CYCLIC-AMP. *(E.)* Grubb, M. N.; Burks, T. F. (Univ. Texas Med. Sch., Houston). *Tex. Rep. Biol. Med.* 32(2):590-591, 1974.

9014 ACUTE AND CHRONIC TOLERANCE TO MORPHINE IN DOG INTESTINE. *(E.)* Burks, T. F.; Grubb, M. N. (Univ. Texas Med. Sch., Houston). *Tex. Rep. Biol. Med.* 32(2):590, 1974.

9015 EFFECTS OF A NOVEL ANALGESIC AGENT ON INTESTINAL MOTILITY. *(E.)* Jacobs, G. R.; Burks, T. F. (Univ. Texas Med. Sch., Houston). *Tex. Rep. Biol. Med.* 32(2):591, 1974.

9016 SUPERSENSITIVITY TO THE INHIBITORY EFFECT OF CATECHOLAMINES ON INTESTINAL PERISTALTIC REFLEX AFTER SYMPATHETIC DENERVATION. *(E.)* Frigo, G. M.; Lecchini, S.; Tonini, M. (Inst. Med. Pharmacol., Univ. Padua, Italy). *Br. J. Pharmacol.* 52(3):446P-467P, 1974.

See also, 9236.

SECRETION AND METABOLISM

017 BODY COMPOSITION AND UTILIZATION OF PROTEIN AND ENERGY IN GROWING RATS AT DIFFERENT DIE-
ARY PROTEIN TO ENERGY RATIOS BY USE OF PURIFIED WHOLE
GG PROTEIN. *(E.)* Tanaka, H.; Yamaguchi, M.; Kame-
aka, M. (Fac. Agric., Univ. Tokyo, Japan). *Agric.
iol. Chem.* 38(6):1113-1120, 1974.

he effect of variation in percentage of dietary pro-
ein calorie (PC) from 0-50% by the use of purified
hole egg protein on the growth, food efficiency, pro-
ein efficiency ratio (PER), body composition, and
fficiencies of protein and energy utilization was
tudied in male weanling Wistar rats. Rats were
aintained on experimental diets with graded levels
f PC% at 410 kcalories of total metabolizable energy
or 3 weeks with purified whole egg protein as the
ietary protein source. After sacrifice, the intact
iver was removed, and its composition and the compo-
ition of the carcass was determined. Body weight
ain (7.3 g/day) and PER (3.9) attained a maximum, and
ood efficiency (0.4) reached a plateau at 10 PC% in
he diet. Carcass lipid gave a blunt peak of accumu-
lation from 5-20 PC%, while liver lipid showed a high
ccumulation in the 5 PC% diet only, attaining the
evel of the fatty liver. Body protein retention
eached a plateau at 15 PC% (little different from the level at 10 PC%), while body lipid retention gave a maximum at 10 PC% showing a gradual decrease thereafter. Energy utilization was constant when expressed as the increment of body energy retention divided by the increment of metabolizable energy intake. At and above 12 or 13 PC%, the efficiency of net body protein energy retention against metabolizable energy intake was constant at about 12.5%.

9018 SECRETIN INHIBITION OF GASTRIN-STIMULATED DEOXYRIBONUCLEIC ACID SYNTHESIS. *(E.)* Johnson, L. R.; Guthrie, P. D. (Univ. Texas Med. Sch., Houston). *Gastroenterology* 67(4):601-606, 1974.

The influence of secretin on biochemical processes related to growth and the relation of such an effect to acid secretion, was studied *in vivo* in male Sprague-Dawley rats. Fasted rats were sacrificed 16 hr after i.p. injections of saline, pentagastrin (250 μg/kg), metiamide (2 mg/kg), secretin (75 U/kg), histamine (20 mg/kg), or combinations of secretin and pentagastrin, or metiamide and pentagastrin. Tissue from the oxyntic gland region, duodenum, and ileum, was incubated for 30 min with [^{3}H]thymidine (2 μc/ml). DNA was extracted, and the incorporation of thymidine was determined by liquid scintillation counting. Results were expressed as disintegrations/min/mg wet weight, or /µg DNA as a percent of the saline-injected control animals. There was no significant difference between these 2 means of expression. Pentagastrin stimulated DNA synthesis to 50, 60, and 100% in duodenal, ileal, and gastric tissues, resp. Neither histamine nor secretin alone affected DNA synthesis in any tissue. Secretin, when given in combination with pentagastrin, completely blocked the stimulation of DNA synthesis. Metiamide, which like secretin, inhibits gastrin-stimulated acid secretion, was ineffective in blocking gastrin-stimulated DNA synthesis. The following conclusions were drawn: 1) the stimulation of DNA synthesis by gastrin is independent of its effect on acid secretion; 2) the stimulation of DNA synthesis by gastrin is prevented by secretin; 3) the antitrophic action of secretin is independent of its effect on gastric acid secretion; and 4) the antitrophic activity of the secretin molecule may depend entirely on the antagonism of gastrin.

9019 CANDIDATE HORMONES OF THE GUT. *(E.)* Grossman, M. I., *et al.* (Wadsworth VA Hosp. Ctr., Los Angeles, Calif.). *Gastroenterology* 67(4):730-755, 1974.

9020 CYCLIC NUCLEOTIDES AND THEIR ROLE IN GASTROINTESTINAL SECRETION. *(E.)* Kimberg, D. V. (Harvard Med. Sch., Boston, Mass.). *Gastroenterology* 67(5):1023-1064, 1974.

9021 STUDIES ON THE ROLE OF CALCIUM IONS IN THE STIMULATION BY ADRENALINE OF AMYLASE RELEASE FROM RAT PAROTID. *(E.)* Dormer, R. L.; Ashcroft, S. J. H. (Univ. Bristol Med. Sch., England). *Biochem. J.* 144(3):543-550, 1974.

9022 AUTORADIOGRAPHIC STUDIES ON THE DISTRIBUTION OF ^{14}C-2-ETHANOL AND ITS NON-VOLTILE METABOLITES IN THE PREGNANT MOUSE. *(E.)* Akesson, C. (Dept. Toxicol., Univ. Uppsala, Sweden). *Arch. Int. Pharmacodyn. Ther.* 209(2):296-304, 1974.

9023 THE INFLUENCE OF PREGANGLIONIC CERVICAL SYMPATHECTOMY ON THE AMYLASE CONCENTRATION OF REFLEXLY PRODUCED PAROTID SALIVA IN THE RAT. *(E.)* Bennett, H.; Hodgson, C.; Speirs, R. L. (London Hosp. Med. Coll., England). *J. Physiol. (Lond.)* 242(2): 145P-147P, 1974.

9024 EFFECTS ON SALIVARY GLANDS OF THE CHRONIC ADMINISTRATION OF ELEDOISIN AND PHYSALAEMIN TO RATS. *(E.)* Cantalamessa, F.; De Caro, G.; Perfumi, M. (Fac. Pharm., Univ. Camerino, Italy). *Br. J. Pharmacol.* 52(3):461P-462P, 1974.

SECRETION AND METABOLISM

Stomach

9025 A STUDY OF AMINO ACIDS IN THE GASTRIC MUCOSA DURING DIFFERENTIATION AND THEIR SIGNIFICANCE. II. *(E.)* Nishioka, T. (Anat. Dept., Wakayama Med. Univ., Japan). *Experientia* 30(8):938-940, 1974.

The effect of lysine, histidine, arginine, tyrosine and isoleucine on morphological and functional differentiation of gastric mucosa was studied in neonatal Wistar rats born to females treated by daily injections of these amino acids during pregnancy. The results were compared to those of a control group which did not receive amino acids and to those of a third group which was injected daily with a mixture of 15 other amino acids. Morphologic differentiation was assessed from hematoxylin-eosin stained mucosal sections while functional differentiation was determined by the appearance of iron hematoxylin staining granules (presumed to be secretory granules) in gastric chief cells of mucosal sections. Morphologic differentiation appeared to take place 2 days earlier in the experimental group than in either of the two control groups. A similar early pattern of functional differentiation of gastric mucosal cells also occurred in the experimental group on the 3rd postnatal day. Secretory granule appearance and, hence, functional differentiation of gastric mucosal cells of both control groups was not observed until the 13th postnatal day. These results are in accordance with previously published data.

9026 EFFECT OF INTRAVENOUS ACETYLCHOLINE ON SERUM GASTRIN LEVELS IN DOGS. *(E.)* Booth, R. A. D.; Reeder, D. D.; Thompson, J. C. (Univ. Texas Med. Branch, Galveston). *Proc. Soc. Exp. Biol. Med.* 146(4):1156-1158, 1974.

he effect of i.v. acetylcholine infusion on serum astrin levels was studied in 5 normal dogs, in 5 ogs with gastric fistulas placed 6 weeks earlier nd in 6 dogs with total gastrectomy performed 10 eeks earlier. The animals were fasted overnight nd acetylcholine (0.5-6 mg/kg/hr) was infused at ncreasing rates over a 5 hr period during which lood samples were periodically drawn for radioimmunoassay of gastrin. Normal dogs and dogs with total gastrectomy showed no alteration in serum gastrin levels during infusion. However, dogs with gastric fistulas draining the innervated stomach ad an immediate 3-fold increase in serum gastrin uring infusion of toxic doses of acetylcholine (2-6 mg/kg/hr). Gastric acid secretion, which was also increased, did so before either significant alteration in circulating levels of serum gastrin or the onset of toxic signs (restlessness, increased salivation, retching, defecation). It was thus concluded that i.v. acetylcholine can stimulate gastric acid secretion without increasing serum gastrin and that increased gastrin release occurs only if gastric acid is removed from the stomach. The released gastrin arises from the gastric antrum.

9027 A STUDY OF AMYLOPECTIN SULFATE AND BILE DAMAGE TO THE GASTRIC MUCOSAL BARRIER: AN EXPERIMENTAL STUDY WITH CANINE HEIDENHAIN POUCHES.

(E.) Calcraft, B. J.; Rhodes, J.; Cross, S.; Hole, D.; Aubrey, A. (Univ. Hosp. Wales, Cardiff). *Am. J. Dig. Dis.* 19(11):1007-1015, 1974.

The protective action against mucosal damage of a sulfated polysaccharide, amylopectin sulfate, was examined in the Heidenhain pouches of 3 dogs. The net fluxes of hydrogen and sodium ion were measured before, during, and after exposure of the mucosa to a 10 mM bile acid solution at pH 2. The potential difference across gastric mucosa was measured during the experiments. Hydrogen ion back-diffusion from and sodium ion gain by the pouch were significantly increased by bile; there was also a simultaneous fall in potential difference. However, when the pouches were first treated with a 2% aqueous solution of amylopectin sulfate, the net increase in the flux of hydrogen and sodium ion was significantly less after exposure to bile. The fall in potential difference was also significantly less. These results suggest that amylopectin sulfate protects gastric mucosa against the damaging effect of bile.

9028 EFFECT OF ETHYL ALCOHOL ON THE BIOSYNTHESIS OF GLUCOSAMINE AND GALACTOSAMINE IN THE HUMAN GASTRIC MUCOSAL TISSUE IN VITRO. *(E.)*

Glowacka, D.; Kopacz-Jodczyk, T.; Mazurkiewicz-Kilczewska, D.; Gindzienski, A. (Inst. Physiol. Biochem., Bialystok, Poland). *Biochem. Med.* 11(3):199-204, 1974.

The effect of ethanol on the biosynthesis of glucosamine and galactosamine by human gastric mucosa *in vitro* was studied. The slices of human gastric mucosa were incubated in medium containing glucose-^{14}C with or without ethanol. Hexosamines were isolated by using ion-exchange column chromatography and then they were purified and separated by means of preparative paper chromatography. It was shown that human gastric mucosa is able to synthesize both glucosamine and galactosamine from glucose *in vitro*. In the presence of ethanol (5.5%), the biosynthesis of glucosamine is unaffected. Galactosamine biosynthesis, however, is significantly reduced, being 50% of the rate of glucosamine synthesis after 3 hr.

9029 STIMULATED CHLORIDE TRANSPORT BY ISOLATED PARIETAL CELLS. *(E.)*

Glick, D. M. (Med. Coll. Wisconsin, Milwaukee). *Biochem. Pharmacol.* 23(23):3283-3288, 1974.

A preparation of rabbit parietal cells has been shown to respond to effectors of gastric acid secretion. The cells were isolated, aligned at the interface of two aqueous phases, and the transport of Cl^- from one phase to the other effected by the cells under various pharmacological stimuli, was measured. Ca^{2+} (10^{-3} M), in contrast to Mg^{2+} (10^{-3} M), was shown to be necessary to elicit secretions of Cl^- across the interface in response to histamine (10^{-3}M). This response was inhibited by prostaglandin E_1 (10 μg/ml). Dibutyryl cyclic AMP was without effect. Carbachol and catecholamines also stimulated secretion, but this was not inhibited by prostaglandin E_1. Because basal Cl^- transport in the presence of Ca^{2+} is in a direction opposite to that of the stimulated transport (and to the low basal transport in the presence of Mg^{2+}), at least two secretion mechanisms appear operative.

9030 THE EFFECTS OF CARBENOXOLONE ON THE BIOSYNTHESIS OF GASTRIC GLYCOPROTEINS IN THE RAT AND FERRET. *(E.)*

Shillingford, J. S.; Lindup, W. E.; Parke, D. V. (Dept. Biochem., Univ. Surrey, Guildford, England). *Biochem. Soc. Transact.* 2(5):1104-1107, 1974.

The effects of carbenoxolone, which has been shown to accelerate healing of gastric ulcers, have been studied on the *in vitro* incorporation of isotopically labeled hexoses and amino acids into glycoproteins of rat and ferret gastric and duodenal mucosae. Animals received carbenoxolone sodium (25 mg/kg) orally in drinking water for 7 days, were then sacrificed and the stomachs and duodena were removed for the kinetic studies. Compared to control animals, carbenoxolone pretreatment caused enhanced rates of incorporation of N-acetyl[^3H]glucosamine, [^{14}C]-galactosamine, [^3H]glucosamine, [^3H]fucose and N-acetyl[^{14}C]neuraminic acid into acid-insoluble glycoproteins of rat and ferret gastric mucosa. The incorporation rate of [^{14}C]galactose into rat but not ferret gastric mucosa was decreased. Carbenoxolone pretreatment did not produce increased rates of incorporation of these sugars into glycoproteins of duodenal mucosa suggesting a significant difference between the glycosylating enzyme systems of these 2 tissues. It is postulated that carbenoxolone protects the gastric mucosa from ulcer formation by simulating synthesis of a modified glycoprotein which yields a more protective mucus.

9031 PRESENCE OF PROSTAGLANDINS E_2 AND A_2 IN CANINE GASTRIC SECRETIONS. *(E.)* Dozois, R. D.; Thompson, C. J. (Dept. Clin. Surg., Univ. Edinburgh, Scotland). *Life Sci.* 15(5):975-986, 1974.

The presence of prostaglandins was determined in gastric juice obtained from 3 conscious dogs, surgically provided with a chronic gastric fistula. Outputs of acid (mEq/min) and prostaglandins (pg/min) were measured in gastric secretions stimulated by pentagastrin (100 or 200 ng/kg/min). Prostaglandin activity was estimated, after extraction and thin-layer chromatography, by radioimmunoassay of the prostaglandin B formed by treatment with alkali. Tritiated prostaglandins were added to the gastric juice for the purpose of correcting for prostaglandin recovery. Using this method, the minimum mass of prostaglandin B which could be satisfactorily distinguished from zero was 25 pg. Prostaglandins A_2 and E_2 were present in pentagastrin-activated gastric secretions and averaged 200.7 ± 18.1 and 260.1 ± 18.0 pg/min, resp. The identity of prostaglandins A_2 and E_2 was confirmed by gas liquid chromatography combined with mass spectrometry. The amount of prostaglandin E_2 converted to prostaglandin A_2 during extraction, separation and conversion procedures was estimated from the amount of $[^3H]$ prostaglandin A_2 found when only $[^3H]$ prostaglandin E_2 had been added to a sample of gastric juice and averaged 14.5% ± 2.0. The preliminary results support the possibility that prostaglandins E_2 and A_2 may be of physiological importance in the regulation of canine gastric secretions.

9032 ACTION OF ACETYLSALICYLIC ACID AND GLUCAGON ON ACID SECRETION, MUCOSAL BLOOD FLOW, BLEEDING AND NET IONIC EFFLUX IN THE FUNDIC POUCH OF PENTAGASTRIN-STIMULATED DOGS. *(E.)* Lin, T. M.; Warrick, M. W. (Eli Lilly Co., Indianapolis, Ind.). *Arch. Int. Pharmacodyn. Ther.* 210(2):279-287, 1974.

Steady gastric HCl and electrolyte secretion and clearance of plasma aminopyrine were resp. maintained in 4 fasting dogs by continuous infusion of pentagastrin (1.2 µg/kg/hr) and aminopyrine (5 mg/kg/hr). At 1/2 hr intervals 25 ml of 0.1 N HCl were instilled into the Heidenhain pouches of 4 dogs, allowed to remain in the pouch for 30 min and then drained for analysis; the process was repeated for 6 hr. In the 4th-6th periods the instillate contained in addition to HCl, 5 mg/ml of acetylsalicylic acid. Acetylsalicylic acid caused hemorrhage, and loss of plasma transferrin ^{51}Cr from mucosa to lumen, and increases in volume of recoverable instillate, gastric clearance of aminopyrine (mucosal blood flow) and net effluxes of Na+, K+, Ca++ and Mg++ and disappearance of acid from lumen to mucosa. Glucagon at 50 µg/kg s.c. in two doses, reversed the actions of acetylsalicylic acid on volume of recoverable instillate and mucosal blood flow and significantly reduced the loss of hemoglobin and plasma transferrin from mucosa to lumen. But the damaging action of acetylsalicylic acid on the integrity of the Na+ barrier and its effect to increase net Ca++ and Mg++ effluxes were unaffected by glucagon. Glucagon decreased the acetylsalicylic acid-induced net K+ efflux by more than 50%. The H+ concentration in the instillate was decreased by acetylsalicylic acid and was further reduced by glucagon. However, the mechanisms by which acetylsalicylic acid and glucagon caused reduction of net H+ efflux were different, the former by breaking down the H+ barrier and the latter, by suppression of active H+ secretion. The reduction of acetylsalicylic acid induced hemorrhage by glucagon lasted for at least 3 hr. The evidence indicates that glucagon may be therapeutically useful for gastric mucosal bleeding in man.

9033 THE ROLE OF AMINO ACIDS AS STIMULANTS OF ANTRAL RELEASE. *(E.)* Kubacz, G. J. (Roy. Perth Hosp., Australia). *Aust. NZ J. Surg.* 44(2): 186-192, 1974.

Various amino acids commonly found in meat and liver extract were studied to determine their effect on gastrin release in male and female dogs with Heidenhain pouches. Gastrin release was measured indirectly by determining the increase in gastric HCl concentration. Of all amino acids tested, only glycine (0.4-0.8 M) and β-alanine (0.4 M) produced consistent and reliable stimulation of acid secretion following antral irrigation. Maximum acid output, however, was only about 33% that following histamine stimulation by i.v. infusion (40 µg/kg/hr). DL-serine, β-alanine and cysteine were relatively weak stimulants of acid output compared to histamine although they had about 50% of the activity of glycine. Phenylalanine, tyrosine, tryptophan and leucine had almost no stimulatory effect on Heidenhain acid secretion.

9034 QUANTITATIVE CYTOCHEMICAL ESTIMATION OF THE EFFECT OF PENTAGASTRIN (0.005-5 pg/ml) AND OF PLASMA GASTRIN ON THE GUINEA-PIG FUNDUS IN VITRO. *(E.)* Loveridge, N.; Bloom, S. R.; Welbourn, R. B.; Chayen, J. (Kennedy Inst. Rheumatol., London, England). *Clin. Endocrinol.* 3(3):389-396, 1974.

To investigate whether the cytochemical approach to the bioassay of hormones could be applied to measure the effect of known concentrations of gastrin, strips of fundus from the stomach of a female Hartley guinea pig were maintained mucus-side upwards, in the presence of T8 culture medium at pH 7.0. The tissue was maintained *in vitro* for 5 hr after which the culture medium was replaced by bicarbonate-depleted T8 medium, containing either graded concentrations of pentagastrin or 2 dilutions (1:100, 1:1000) of human plasma. After 5 min the tissue was removed and chilled to -70C. Tissues were sectioned at 18 µm, flash-dried and left at room temperature for 5-10 min, after which they were reacted for carbonic anhydrase activity. The amount of reaction product was measured in the parietal cells by a scanning and integrating microdensitometer. A positive linear correlation was found between the mean integrated extinction in the parietal cells and logarithm of the concentration of pentagastrin in the culture medium over the range 0.005-5.0 pg/ml Four strips of fundus were subjected to 4 logarithmic concentrations of pentagastrin and 2 were treated with T8 medium containing 1:100 or 1:1000 dilutions of a human plasma for 5 min. From the calibration graph of e effect of the graded concentrations of pentastrin, the concentration of gastrin activity in e plasma could be calculated. The 2 dilutions gave lues of 100 pg/ml and 80 pg/ml, resp. It was erefore possible, using this cytochemical techque, to measure pentagastrin down to a level of 005 pg/ml (6.5 X 10^{-15} M), and gastrin-like acvity in human plasma at concentrations at least uivalent to, or less than, 0.05 pg/ml (2.3 X 10^{-14} of human gastrin. The results were in reasonable greement with those obtained by radioimmunoassay.

035 INVESTIGATIONS INTO THE REDUCTION OF PEPSIN ACTIVITY BY BILE.

(E.) Tompkins, R. K.; yashi, R. M. (Univ. California Sch. Med., Los Angees). *Am. J. Surg.* 128(5):633-637, 1974.

o further elucidate the mechanism by which canine ile is able to inhibit pepsin activity, *in vitro* tudies were conducted to determine the effects of xidized canine bile and the effects of conjugated anine bile acids on purified porcine pepsin actiity. Oxidized bile had no inhibitory effect on the bility of pepsin to digest an acidified hemoglobin ubstrate. Conjugated bile acids, however, in conentrations from 0.0025 to 0.04 M showed a doseependent inhibitory effect on pepsin activity for epsin concentrations ranging from 10 to 100 μg/0.5 l. The taurine and glycine conjugates of chenoeoxycholic acid were more effective inhibitors than ere the cholic acid conjugates. A sample of human ile with a total bile salt concentration of 0.036 M lso had pepsin-inhibiting activity. These results upport the theory that bile protects the duodenum rom peptic ulceration by inhibiting pepsin activity nd therefore removal of bile by surgical procedures e.g. choledochojejunostomy) may predispose to postperative peptic ulceration.

036 THE EFFECT OF AMYLOPECTIN SULFATE (SN-263) ON THE PEPTIC ACTIVITY OF HUMAN GASTRIC UICE.

(E.) Berstad, A. (Aker Hosp., Oslo, Norway). *cta Hepatogastroenterol.* 21(3):212-220, 1974.

he antipeptic activity of the sulfated polysaccharide amylopectin sulfate (SN-263) was studied using uman gastric juice *in vivo* and *in vitro*. *In vitro* n almost complete reduction of the peptic activity of gastric juice was found by mixing SN-263 with the hemoglobin substrate. The inhibition could be completely overcome by increasing the amount of substrate, but there was still a linear relationship between enzyme concentration and reaction rate also with SN-263, so that, the mechanism of the reduced activity is not substrate depletion. The results suggest that SN-263 does not directly inhibit pepsin to any significant degree, but combines with and masks or makes the substrate protein less digestible by pepsin. Intragastric instillation of 500 mg of SN-263 in 8 healthy volunteers and 1 duodenal ulcer patient only slightly depressed the peptic activity of the gastric content. "Model" experiments with substrate-containing agar on a plate simulating the mucosa and wells in the agar similating peptic ulcers showed that addition of SN-263 to the wells before the addition of gastric juice was not very effective in reducing the peptic digestion, possibly because SN-263 poorly adhered to the agar. However, when SN-263 was melted into the agar, marked reduction of the peptic activity was observed. The results thus confirm that SN-263 can protect the substrate from peptic digestion but to what extent the substance may modify the digestibility of the gastric or duodenal epithelium must to a large extent depend on its ability to adhere to the mucosa *in vivo*.

9037 METHOD FOR ISOLATION AND SEPARATION OF CELLS FROM RAT FUNDIC MUCOSA.

(Fr.) Lewin, M.; Cheret, A. M.; Soumarmon, A.; Girodet, J. (Bichat Hosp., Paris, France). *Biol. Gastroenterol. (Paris)* 7(2):139-144, 1974.

The stomach was isolated in vitro as an everted pouch, and diluted pronase was introduced into the interior of the sack. Digestion proceeded for 90 min, and then the stomach was removed. Dissociation continued for another 30 min under magnetic agitation. The extract was filtered, centrifuged twice, and resuspended. Cell separation was effected by taking 15 to 20 ml fractions from a linear density gradient established between 1.05 and 1.30 g/cm^3 by isopycnic equilibration. The yield was estimated at 25%. Oxygen consumption was .2 μM/10^6 cells/hr. The cells were perfectly isolated from each other and fell into 2 groups: 1) clear cells with a mean diameter of 9.5 μ comprising 75% of the total; pepsinogen dye presented an optimum at the zone of density 1.24-1.26, in which zone the mean diameter was 9 μ (the chief cells); this density level included 35% of the chief cells and less than 1% of parietal cells; 2) cells with granular contents comprising 25% of the total; cytochrome c oxydase dye presented an optimum at the zone of density 1.19-1.20, in which zone the mean diameter was 16 μ (parietal cells); at this density level 80% of the cells were parietal. The structural integrity of the cells was satisfactory; the extent of their functional integrity remains to be determined.

9038 EFFECT OF METIAMIDE, A HISTAMINE ANTAGONIST OF H_2-RECEPTORS, ON ACID SECRETION OF ISOLATED CANINE STOMACH PERFUSED WITH HOMOLOGOUS BLOOD.

(E.) Kowalewski, K.; Kolodej, A. (Surg. Med. Res. Inst., Univ. Alberta, Edmonton, Canada). *Pharmacology* 11(4):207-212, 1974.

Totally isolated canine stomachs, perfused with homologous blood, were used to study the inhibitory action of metiamide. The stomach was dissected from anesthetized dogs which had been fasted for 48 hr and connected with the perfusion circuit by the preceliac segment of the aorta and the distal portal vein. Oxygenation and dialysis of perfusion blood took place in supporting gastrectomized dogs. Histamine (150 μg/hr) and bethanechol chloride (500 μg/hr) were infused separately or combined into the gastric artery for 6-7 hr. When the base-line secretion was established after 2-3 hr, metiamide (200 μM/hr) was infused for 2 hr, then infusion of the stimulant continued for the remaining 2-3 hr. Under all conditions of stimulation used in this study, metiamide significantly inhibited the concentration and output of HCl. In all stomachs studied there was a complete absence of titrable H+ at a certain stage of metiamide infusion or following such an infusion. These results indicate that the action of metiamide is not selectively limited to the antagonism of H_2-receptors, acting against both H_2-receptors and muscarinic receptors.

9039 BICARBONATE SECRETION IN THE HUMAN STOMACH. *(E.)* Andre, C.; Bruhiere, J.; Vagne, M.; Lambert, R. (INSERM, Edward Herriot Hosp., Lyon, France). *Acta Hepatogastroenterol.* 20(1):62-69, 1973.

The output of bicarbonate, sodium chloride and potassium was studied in 20 healthy patients after a gastric load by buffered glycine test meal. The outputs were compared in basal conditions and after the injection of betazole (Histalog). Under basal conditions, secretion of bicarbonate, chloride and potassium was 1.17, 1.78 and 0.18 mEq/10 min, resp. Sodium was absorbed (mean output of -0.69 mEq/10 min). In the presence of Histalog, increased rates of secretion of bicarbonate (235-266%), chloride (373-580%) and potassium (138-185%) were observed. A significant increase in sodium secretion was also found. The increase in bicarbonate and sodium output pointed to a variation of the alkaline component of gastric juice. Thus, bicarbonate secretion in the human stomach is not steady and increases when the fundic mucosa is stimulated. High concentrations of chloride and bicarbonate are explained by the trapping effect of glycine buffer on hydrogen ions.

9040 THE EFFECT OF MUCOSAL DAMAGE ON GASTRIC GLYCOPROTEIN SYNTHESIS IN THE RAT. *(E.)* Dekanski, J. B.; Macdonald, A.; Parke, D. V. (Biorex Lab., London, England). *Br. J. Pharmacol.* 52(3): 464P-465P, 1974.

9041 EFFECT OF CHOLINERGIC MECHANISMS ON RAT GASTRIC MUCOSAL cAMP. *(E.)* Ruoff, H. J. (Pharmacol. Inst., Univ. Tubingen, Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 282(Suppl.):R82, 1974.

9042 PENTAGASTRIN STIMULATION OF PROTEIN SYNTHESIS IN GASTRIC AND DUODENAL TISSUES. *(E.)* Enochs, M. R.; Johnson, L. R.; (Univ. Texas Med. Sch., Houston). *Tex. Rep. Biol. Med.* 32(2): 586-587, 1974.

9043 PRELIMINARY DATA ON THE INHIBITION OF PENTAGASTRIN STIMULATED GASTRIC SECRETION INDUCED BY SOME NATURAL AND SYNTHETIC PEPTIDES. *(E.)* Bertaccini, G.; De Castiglione, R.; Impicciatore, M. (Dept. Pharmacol., Univ. Parma, Italy). *Br. J. Pharmacol.* 52(3):463P, 1974.

9044 EFFECT OF HISTAMINE H_2-RECEPTOR ANTAGONISTS ON GASTRIC SECRETION, CIRCULATION, AND ACID-BASE-BALANCE IN CATS. *(E.)* Albinus, M.; Sewing, K. F. (Pharmacol. Inst., Univ. Tubingen, Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 282 (Suppl.):R1, 1974.

9045 THE EFFECT OF SALICYLATE ON GASTRIC MUCOSAL POTENTIAL DIFFERENCE AND ACID SECRETION. *(E.)* Jorgensen, T. G.; Geisel, A. (Michael Reese Hosp., Chicago, Ill.). *Eur. Surg. Res.* 6(1): 47, 1974.

9046 METABOLIC EFFECTS OF ETHANOL ON THE GASTRIC MUCOSA. *(E.)* Tague, L. L.; Shanbour, L. L.; (Univ. Texas Med. Sch., Houston). *Tex. Rep. Biol. Med.* 32(2):588, 1974.

9047 EFFECTS OF SALBUTAMOL ON GASTRIC ACID SECRETION AND GASTRIN LIBERATION AFTER FEEDING IN CONSCIOUS HEIDENHAIN POUCH DOGS. *(E.)* Curwain, B. P., Fielding, L. P.; Russell, C. (St. Mary's Hosp., London, England). *Br. J. Pharmacol.* 52(3): 462P-463P, 1974.

9048 ELECTROPHYSIOLOGICAL EFFECTS OF SECRETORY INHIBITORS IN THE DOG STOMACH. *(E.)* Kuo, Y. M.; Bowen, J. C.; Chou, A. C.; Shanbour, L. L.; Jacobson, E. D. (Univ. Texas Med. Sch., Houston). *Tex. Rep. Biol. Med* 32(2):587, 1974.

9049 IMPAIRED GASTRIC SECRETION IN RATS TREATED WITH 5-AZACYTIDINE. *(E.)* Korbova, L.; Kohout, J.; Cihak, A. (Inst. Pathol. Physiol., Charles Univ., Prague, Czechoslovakia). *Arch. Int. Pharmacodyn. Ther.* 209(2):332-341, 1974.

See also, 9290.

Pancreas

050 THE SECRETION OF ALKALI METAL IONS BY THE PERFUSED CAT PANCREAS AS INFLUENCED BY THE OMPOSITION AND OSMOLALITY OF THE EXTERNAL ENVIRON-ENT AND BY INHIBITORS OF METABOLISM AND Na+, K+ ATPase ACTIVITY. *(E.)* Case, R. M.; Scratcherd, T. Jniv. Med. Sch., Newcastle upon Tyne, England). . *Physiol. (Lond.)* 242(2):415-428, 1974.

he mechanisms of the secretion of sodium and potas-ium were studied in isolated cat pancreas; the pos-ibility that sodium is actively transported was lso examined. The pancreas was isolated from cats hich had been fasted for 18 hr and perfused with icarbonate buffered saline solutions of varying omposition and osmolality, and stimulated maximally ith secretin. Under isosmolal conditions (the pan-reatic secretion which occurs when the perfusate smolality is at normal physiological values), when erfusate sodium chloride was replaced by sucrose, odium and potassium secretion were directly related to erfusate sodium concentration, [Na]p. When osmola-ity was varied by increasing or decreasing NaCl oncentration, the secretion of sodium and of potas-ium were maximal at [Na]p of about 120 and 80 mM, esp. When potassium concentration was varied over he range 0-130 mM under isosmolal conditions, secre-ion of potassium and of sodium was maximal at per-usate potassium concentration, [K]p, of about 50 nd 100 mM, resp. Water flux was maximal at a [K]p f 10-15 mM. The concentration of potassium in the ecretion was almost identical with that in the per-usate over the whole concentration range. Replace-ent of perfusate sodium by lithium reduced the olume of secretion. Omission of potassium from the erfusate reduced secretion by about 65%. Secretion as reduced by more than 90% under anaerobic condi-ions and in the presence of dinitrophenol or cya-ide. Removal of glucose from the perfusate reduced ecretion by more than 50% within 30 min. Ouabain, thacrinic acid, and frusimide, known inhibitors of Ja+, K+-ATPase activity, all inhibited pancreatic lectrolyte secretion. From these observations, here are many features of electrolyte transport n the pancreas which bear a marked similarity to echanisms involved in sodium pumps operating in ther tissues. The evidence suggests that the pan-reas may transport sodium actively.

051 CALCIUM EFFLUX AND SECRETION OF α-AMYLASE FROM RAT PANCREAS. *(E.)* Heisler, S. (Univ. Hosp. Ctr., Univ. Sherbrooke, Canada). *Br. J. Pharmacol.* 52(3):387-392, 1974.

The effect of carbachol on rapid changes in calcium metabolism, especially in relation to the secretion of α-amylase from the pancreas was investigated in pancreatic fragments (10-20 mg) from female Sprague-Dawley rats. Tissue was incubated for 30 min in Krebs-Ringer bicarbonate containing either 0.05, 0.1 or 1.0 mM $CaCl_2$, and ^{45}Ca (0.5 μC/ml). The values for ^{45}Ca space were obtained by dividing the amount of ^{45}Ca taken up/g protein of tissue by the concentration of ^{45}Ca/ml of incubation medium. A reduction in extracellular Ca in the pancreas from 1.0 to 0.05 mM increased ^{45}Ca space 1.61 times. The uptake of ^{45}Ca was determined by incubation of pancreatic tissue for various periods of time in medium containing 0.05 mM $CaCl_2$ (0.5 μC ^{45}Ca/ml). The time required to preload the pancreas maximally with ^{45}Ca was 20 min. Pooled pancreatic fragments were preincubated for 30 min with medium containing 0.05 mM $CaCl_2$ and 0.5 μC/ml ^{45}Ca, after which the fragments were incubated with carbachol 10^{-5}M, dibutyryl cyclic AMP 10^{-3}M, and carbachol 10^{-5}M and dibutyryl cyclic AMP 10^{-3}M. Carbachol increased the rate of ^{45}Ca efflux from the tissue and this effect was associated with an increase in the release of α-amylase. Dibutyrl cyclic AMP also caused a secretory response, but did not alter the rate of ^{45}Ca efflux. In combination with carbachol, the dibutyrl cyclic AMP reduced the carbachol-stimulated increase ^{45}Ca efflux while enhancing the release of secretory protein. The stimulatory effect of carbachol on ^{45}Ca efflux continued to be observed when pancreatic tissues were incubated in media containing a high concentration of ethyleneglycolbis (β-aminoethyl)-*N*,*N*'-tetraacetic acid. Atropine, however, blocked the effects of carbachol on both ^{45}Ca efflux and secretion of α-amylase. It is suggested that intracellular calcium can and may sustain stimulus-secretion coupling in the rat exocrine pancreas.

9052 EFFECT OF ETHANOL ON PANCREATIC ENZYME SECRETION. *(E.)* Valenzuela, J. E.; Salinas, J.; Petermann, M. (Sch. Med., Univ. Chile, Santiago). *Gastroenterology* 67(5):991-995, 1974.

The direct effect of ethanol and ingestion of ethanol on amylase secretion was investigated *in vitro* in pigeon pancreas slices. The slices were incubated with ethanol at a final concentration of 0.066 M (0.3%) or 0.132 M (0.6%), considered to be compatible with moderate to severe intoxication *in vivo*. Cholecystokinin-pancreozymin was added separately or together with ethanol, before incubation, in a final concentration of 2 or 4 Crick-Harper-Raper U/ml of medium. Amylase activity was measured at the end of the incubation period. Spontaneous amylase secretion into the incubation media was unaffected by the addition of ethanol. In *in vivo* experiments, ethanol (4 g/kg body weight in a 10% starch solution) was injected into the birds' stomachs, and the animals sacrificed at 2, 4, 8, 12, 16 and 32 hr after alcohol ingestion. Oral ethanol induced amylase release, but the maximal secretory effect occurred when blood ethanol had returned to basal level. The delayed secretory effect of ethanol produced a state in which the pancreas contained a high enzyme concentration. This state may be related to the mechanism that produces alcoholic pancreatitis.

9053 EFFECTS OF STARVATION AND ISLET HORMONES ON THE SYNTHESIS OF AMYLASE IN ISOLATED EXOCRINE PANCREAS OF THE MOUSE. *(E.)* Danielsson,

A.; Marklund, S.; Stigbrand, T. (Dept. Histol., Univ. Umea, Sweden). *Acta Hepatogastroenterol.* 21(4): 289-297, 1974.

The *in vitro* incorporation of L[^{14}C] leucine into amylase and total protein was studied in pieces of exocrine mouse pancreas. Female mice, 6-7 months old, were starved for 24 hr and injected i.p. with glucose and/or diazoxide 6 hr before decapitation. The pancreas was excised and microdissected, and the pieces incubated in a basal medium (a Krebs-Ringer bicarbonate buffer) containing ^{14}C-labeled L-leucine (total concentration, 0.8 mM). After incubation, the pieces of pancreas were sonicated and the homogenates and incubation media analyzed for amylase activity. Amylase was isolated from other pancreatic proteins in a single step, using isoelectric focusing in a polyacrylamide gel. The incorporation of L-leucine into total pancreatic protein was determined by liquid scintillation. The synthesis of both amylase and total protein was decreased by starvation. Administration of glucose to starved mice increased the amylase content in the pancreas. This effect was blocked by the concomitant injection of diazoxide, a potent inhibitor of glucose-induced insulin release. Insulin, glucose or glucagon had no effect on amylase or protein synthesis in mouse pancreas pieces when these substances were added to the *in vitro* incubation media.

9054 CONTROL OF PANCREATIC PROTEIN SECRETION.

(E.) Solomon, T.; Leis, P.; Solomon, N.; Shanbour, L. L.; Jacobson, E. D. (Univ. Texas Med. Sch., Houston). *Tex. Rep. Biol. Med.* 32(2):589, 1974.

9055 Na$^+$ ION AS ACTIVATOR OF α-AMYLASE.

(E.) *Experientia* 30(10):1133, 1974.

9056 EFFECT OF ETHANOL ON EXOCRINE PANCREATIC METABOLISM AND SECRETION.

(E.) Solomon, N.; Solomon, T.; Jacobson, E. D.; Shanbour, L. L. (Univ. Texas Med. Sch., Houston). *Tex. Rep. Biol. Med.* 32(2):589, 1974.

SECRETION AND METABOLISM

Hepatobiliary Tract

9057 CYTOTOXIC EFFECT OF ALCOHOL ON LIVER CELLS AND FIBROBLASTS IN VITRO.

(E.) Walker, F.; Elmslie, W.; Fraser, R. A.; Shape, P.E.; Watt, G. C. M. (Dept. Pathol., Univ. Aberdeen, Scotland). *Scott. Med. J.* 19(3):125-127, 1974.

Cultures of liver cells (Chang) and of fibroblasts (3T6) were exposed to media containing up to 1% v/v ethanol. The number of viable cells was determined 3 days later. Liver cell survival decreased progressively at ethanol concentrations over 0.25% v/v while fibroblast survival decreased progressively at concentrations over 0.50% v/v. Thus, ethanol is more toxic to liver cells than to fibroblasts. Compared with a 70% proof spirit derived from ethanol, brandy was significantly more toxic to both liver cells and fibroblasts; gin was more toxic to liver cells but not to fibroblasts; and whisky was not statistically more toxic to either liver cells or fibroblasts. These findings indicate that high congener beverages, such as brandy, are potentially more cirrhogenic than low congener beverages. It is suggested that sufficient alcohol must be ingested to repeatedly raise the blood ethanol concentration above the level at which liver cell necrosis, as opposed to mere degeneration, occurs. This threshold is between 200-320 mg/100 ml.

9058 EFFECT OF DIETARY FRUCTOSE ON IN VITRO AND IN VIVO FATTY ACID SYNTHESIS IN THE RAT.

(E.) Romsos, D. R.; Leveille, G. A. (Dept. Food Sci., Michigan State Univ., East Lansing). *Biochim. Biophys. Acta* 360(1):1-11, 1974.

Diets containing either [U-^{14}]glucose or [U-^{14}]fructose as the only source of carbohydrate were fed to male Sprague-Dawley rats to investigate the effect of substrate concentration on *in vitro* hepatic fatty acid synthesis and to obtain *in vitro* and *in vivo* estimates of the relative contribution of hepatic and extrahepatic tissue to fatty acid synthesis in glucose- and fructose-fed rats. At near physiological substrate concentrations (10 mM), both glucose- and fructose-fed rats incorporated fructose into hepatic fatty acids to a greater extent (2- to 4-fold) than glucose. However, when the substrate concentration was increased to 100 mM, glucose incorporation in fatty acids was much greater than that of fructose (244 ± 32 and 126 ± 30 nM of labeled glucose incorporated for glucose- and fructose-fed animals as compared to 3 ± 1 and 5 ± 1 nM of incorporated fructose for glucose- and fructose-fed animals, resp.). *In vivo* hepatic ATP levels were significantly elevated in rats fed fructose rather than glucose, while high levels of fructose (100 mM) in he incubation medium markedly depressed ATP levels n liver slices as well as inhibiting ^{14}C-acetate ncorporation into fatty acids. *In vivo* estimates f fatty acid synthesis using ^{14}C-acetate and $^{3}H_2O$ ndicated that while the total capacity of the animal o synthesize fatty acids was unchanged, the relative mportance of the liver was increased and that of he extra-hepatic tissues decreased when fructose, ather than glucose, was fed to rats. The magitude of response to dietary fructose was greater hen tritium rather than radiocarbon was utilized.

059 EFFECTS OF THE HYPOCHOLESTEROLEMIC DRUG CLOFIBRATE ON HEPATIC MITOCHONDRIAL BIOENESIS.

(E.) Gear, A. R. L. (Dept. Biochem., Univ. irginia, Charlottesville). *S. Afr. J. Sci.* 70(8): 53, 1974.

n *vitro* and *in vivo* animal studies were performed o assess the effect of the hypocholesterolemic drug lofibrate on hepatic mitochondrial biogenesis. Cloibrate raised hepatic mitochondrial levels in test nimals by over 100%, with a maximum increase occurring 2-4 days after drug administration and a slow ise continuing on day 10. No change in particle ize or specific DNA or RNA content was observed. alf-life measurements with ^{14}C-guanidinio arginine howed no significant clofibrate-induced alterations rom the normal half-life (5.8 days) for mitochondria. he initial rate of short-term ^{35}S-methionine incororation into mitochondria of drug-tested animals was, owever, 40% greater than that for control animals, hile the *in vitro* efficiency of ^{14}C-leucine incororation into mitochondria of drug-treated animals as 61% of that for controls. Enzyme activity of rug-tested animals was not significantly altered or inner membrane or matrix enzymes. A 30-40% fall n specific activity of 3 outer membrane enzymes was, owever, noted from 2-15 days. Clofibrate did inibit the neutral protease activity of mitochondria, ith a 38% inhibition of the control value of 0.334 M amino acid/hr/mg protein observed on day 2. A aximum inhibition of 50% occurred on day 6, and protease activity was still only 63% of its control alue on day 20. *In vitro* additions of clofibrate ad negligible influence on neutral protease activty. Protease inhibition was independent of lysoomes since the activity of the latter was not hanged either in whole homogenates or in the puriied mitochondrial fractions during drug treatment. he findings support the hypothesis that net levels f hepatic mitochondria may be controlled by the ctivity of their own neutral proteases.

060 ISOLATION OF A CARCINO-EMBRYONIC-ANTIGEN (CEA) FROM A LIVER METASTASIS OF PRIMARY DENOCARCINOMA OF THE COLON AND PREPARATION OF THE PECIFIC ANTISERUM.

(E.) Mistretta, A. P.; Bartorelli, A.; Golferini, A.; Tassi, G. C.; De Barbieri, .; Accinni, R. (S. Belfanti Milan Inst. Serum Ther., Italy). *Experientia* 30(10):1209-1210, 1974.

An improved method for carcinoembryonic antigen (CEA) purification suitable for large quantities of material is described. Extraction of a lyophilized powder obtained from freeze-dried supernatant collected from centrifugation of a suspension of 1 kg liver metastases (primary adenocarcinoma of the colon) and equal volumes of water and 2 N perchloric acid according to Meltzer's technique with 3 M potassium chloride removed about 75% of inert substances with no appreciable loss of CEA. The CEA was eluted at a molarity of 0.1 from DEAE-cellulose with the aid of a phosphate buffer. CEA was also detectable in small quantities in the 0.05 M fraction. Elution on Sephadex G-200 gave 3 peaks, with the CEA detectable only in the middle of the 3 peaks. The yield of the purification method was 100-120 mg CEA/kg liver metastases; the whole process took about 3 weeks. The purified CEA, when compared with a reference antigen at the same concentration, showed the same specific activity and equal binding capacity after labeling. Immunoelectrophoresis of the purified CEA showed only 1 band when the antigen was tested against either anti-CEA or anti-liver metastases antiserum obtained from Pearbright White guinea pigs. No bands were observed when the CEA was tested against normal guinea pig anti-liver antiserum.

9061 TRANSCRIPTIONAL CONTROL OF α-FOETOPROTEIN SYNTHESIS IN DEVELOPING MOUSE LIVER.

(E.) Koga, K.; O'Keefe, D. W.; Iio, T.; Tamaoki, T. (Univ. Alberta Cancer Res. Unit, Edmonton, Canada). *Nature (Lond.).* 252(5483):495-497, 1974.

RNA was extracted from polysomes of fetal (14 day) and adult ICR mouse liver and measured for its ability to direct the synthesis of α-fetoprotein in cell-free systems to determine whether the decrease in α-fetoprotein in adult liver is due to an alteration in messenger-RNA synthesis or in m-RNA translation. Some of the extracts were further fractionated into ribosomal washes (high-salt extracts upon which the translation of polysomal RNA depends). Polyacrylamide gel electrophoretic analysis of proteins produced in the fetal liver cell-free system in the presence of fetal polysomal RNA and fetal ribosomal wash revealed 4 main fractions, 2 of which comigrated with carrier α-fetoprotein and albumin, resp. The substitution of fetal ribosomes and high speed supernatant fraction with adult counterparts did not affect the synthesis of fetoprotein, suggesting that either messenger RNA or ribosomal wash was responsible for the regulation of α-fetoprotein synthesis. When fetal polysomal RNA was used as a template, α-fetoprotein synthesis exceeded albumin synthesis. (used as an internal control) 2- to 3-fold with either fetal or adult ribosomal wash. When adult polysomal RNA was used as the template, the synthesis of α-fetoprotein decreased drastically with either fetal or adult ribosomal wash. Albumin synthesis was relatively unchanged, and thus the ratio of α-fetoprotein to albumin synthesis decreased. These results indicated that α-fetoprotein messenger RNA was deficient in the adult polysomal RNA, although the factors necessary for its translation were present in adult liver. The possibility that active α-fetoprotein messenger RNA might be present in the nucleus or in the cytoplasm in a free form was tested by fractionating the adult liver into nuclei and cytoplasm, extracting RNA from each fraction, and measuring its ability to synthesize α-fetoprotein and albumin. Synthesis of α-fetoprotein by nuclear or cytoplasmic RNA was small, suggesting that the level of α-fetoprotein messenger RNA in adult liver is greatly reduced. The possibility that α-fetoprotein messenger RNA was degraded during extraction from adult liver was ruled out since albumin messenger RNA was extracted in an active form from the same source.

9062 ACTION OF METHANETHIOL ON NA$^+$, K$^+$-ATPASE: IMPLICATIONS FOR HEPATIC COMA. *(E.)* Foster, D.; Ahmed, K.; Zieve, L. (Minneapolis VA Hosp., Minn.). *Ann. NY Acad. Sci.* 242:573-576, 1974.

The action of methanethiol on the rat brain sodium-, potassium-ATPase system was investigated in terms of its possible molecular site of action and its implications for hepatic coma in humans. Various amounts of methanethiol were added to 10 μg of enzyme protein (incubated for 10 min at 37 C) in a sealed reaction tube, and specific activities for sodium- and potassium-stimulated ATPase and potassium-stimulated *p*-nitrophenylphosphatase were recorded. The introduction of increasing amounts of methanethiol (0.19-1.90 μM) resulted in increasing inhibition of the ATPase system (46%-74%), though the response to inhibitor concentration was not linear. The potassium-stimulated *p*-nitrophenylphosphatase system was not inhibited, but was slightly stimulated, under similar conditions. A comparison of the effect of compounds related to methanethiol on the sodium-, potassium-ATPase system showed the following declining order of inhibitor potency: methanethiol, ethanethiol, and dimethyl sulfide (45, 44, and 18% inhibition, resp.). Dithiothreitol and 2-mercaptoethanol did not influence the ATPase system activity nor did they reduce the inhibitory effect of methanethiol on the enzyme. A comparison of the effects of methanethiol on the mitochondrial ATP-phosphate exchange reaction and on the microsomal membrane sodium, potassium-ATPase activity revealed that the former was essentially unaltered by methanethiol, suggesting that the mercaptan may be selective in its action on membranes and that the sodium-, potassium-ATPase may be a preferred site. The primary site of action of methanethiol on the sodium-, potassium-ATPase system appears to be the sodium-dependent portion of the sequence. Prolonged exposure to methanethiol, for example in chronic hepatic coma, may result in inhibition of the ATPase system as a consequence of increased concentrations of methanethiol and other mercaptans in the nerve cell membrane.

9063 FUNCTIONAL REGENERATION IN LIVER OF OLD RATS AFTER PARTIAL HEPATECTOMY. *(E.)* Obenrader, M.; Chen, J.; Ove, P.; Lansing, A. I. (Univ. Pittsburgh Sch. Med., Pa.). *Exp. Gerontol.* 9(4):181-190, 1974.

Ferritin metabolism and albumin synthesis were investigated in regenerating liver sections from partially hepatectomized young (4-6 week-old) and old 17-20 month-old) female Fisher rats to investigate whether changes in liver protein metabolism occurring with age are due to somatic mutations. Regenerating rat liver from old animals appeared to regain the functional properties of young rat liver, suggesting that the metabolic changes associated with age are not due to changes in the genome. Albumin synthesis, elevated in old animals, returned to young rat levels in old rats for several weeks after the partial hepatectomy. Old rat ferritin also underwent changes in regenerating liver. The amount of ferritin iron/g liver fell to about 1/2 its previous value 1 week following partial hepatectomy and the amount of iron/mg ferritin protein also dropped by about the same proportion during the same time period. However, the amount of ferritin protein/g liver remained constant in regenerated old rat liver. The half-life of ferritin in regenerated old rat liver (2.3 days) was much shorter than in old rat liver controls (3.9 days) and approached that of young rat liver ferritin (2.1 days). The functional properties of old rat liver were restored 12 weeks following partial hepatectomy.

9064 ALPHA$_1$-FETOPROTEIN BIOSYNTHESIS DURING THE GROWTH CYCLE OF DIFFERENTIATED FETAL RAT HEPATOCYTES IN PRIMARY MONOLAYER CULTURE. *(E.)* Leffert, H. L.; Sell, S. (Salk Inst., San Diego, Calif.). *J. Cell Biol.* 61(3):823-829, 1974.

The production of α_1-fetoprotein by primary cultures of differentiated fetal rat hepatocytes was studied by radioimmunoassay. Logarithmically replicating cells showed a 10-fold increase in accumulated radioimmunoassayable α_1-fetoprotein (> 1000 ng/ml) from the 1st to the 6th day after seeding of the cultures. Cultured fetal rat fibroblasts showed no such increase from a small, basal rate of production (70-80 ng/ml). Log phase hepatocyte cultures released 6 times as much ^{3}H-leucine-labeled fetoprotein into the medium as did lag phase cultures (i.e., within 24 hr after seeding). The amount released declined as log phase cultures became confluent and entered contact inhibition of growth. The appearance of ^{3}H-leucine-labeled α_1-fetoprotein in the medium was also inhibited by cycloheximide (5 μg/ml). Studies of α_1-fetoprotein synthesis in stationary cultures stimulated to undergo a round of DNA synthesis and cell division by refeeding with fresh medium showed that α_1-fetoprotein synthesis was first detected 8 to 10 hr after the first wave of DNA synthesis and was maximal 5 to 6 hr after the first cells entered mitosis.

9065 EFFECT OF CHRYSENE AND CARBON TETRACHLORIDE ADMINISTRATION ON RAT HEPATIC MICROSOMAL MONOOXYGENASE AND UDPGLUCURONOSYLTRANSFERASE ACTIVITY *(E.)* Aitio, A. (Dept. Physiol., Univ. Turku, Finland). *FEBS Lett.* 42(1):46-49, 1974.

The activities of rat hepatic microsomal aryl hydrocarbon hydroxylase and uridine 5'-diphosphate (UDP) glucuronosyltransferase were determined 24 hr following treatment with either chrysene (20 mg/kg i.p.) or CCl$_4$ (1 ml/kg by gastric intubation). CCl$_4$ produced more than a 50% decrease in aryl hydrocarbon hydroxylase activity as well as a concomitant 75% decrease in cytochrome P450 content. UDP glycorunosyltransferase activity was stimulated 2-fold by CCl_4, and this evidently due to activation rather than induction since digitonin-treated microsomes showed decreased activity.

9066 HEPATIC NECROSIS CAUSED BY FUROSEMIDE. *(E.)*

Mitchell, J. R.; Potter, W. Z.; Hinson, J. A.; Jollow, J. D. J. (Natl. Heart Lung Inst., Natl. Bethesda, Md.). *Nature* [illegible] 251(5475):508-511, 1974.

The diuretic, furosemide, was converted by a microsomal enzymes in the liver of mice and humans to a reactive arylating metabolite which produced massive hepatic necrosis in mice. Histologic study of liver sections from male Swiss albino mice at various times after i.p. instillation of furosemide (400 mg/kg) at greater than therapeutic doses demonstrated single cell unaffected. Studies using different furosemide conseverely damaged livers showed massive midzonal and centrilobular necrosis. Kupffer cells were generally unaffected. Studies using different furosemide concentrations showed that the effect was dose-dependent. Liver damage was prevented when metabolism of furosemide was prevented by pretreatment of mice with 3 different types of cytochrome P-450 enzyme inhibitors. *In vitro* covalent binding of ^{3}H-furosemide or ^{32}S-furosemide to hepatic microsomal proteins required oxygen and a reduced nicotinamide-adenine dinucleotide phosphate generating system. An arylating metabolite was detected covalently bound to microsomal protein leading to the conclusion that the arylation of liver macromolecules by a reactive furosemide metabolite is causally related to the development of furosemide-induced hepatic necrosis.

9067 HEPATIC KETOGENESIS AND GLUCONEOGENESIS IN HUMANS. *(E.)*

Garber, A. J.; Menzel, P. H.; Boden, G.; Owen, O. E. (Temple Univ. Hlth. Sci. Ctr., Phila., Pa.). *J. Clin. Invest.* 54(4): 981-989, 1974.

Hepatic ketone-body production was studied in 5 human volunteers following a 3 day fast. In addition, hepatic gluconeogenesis as well as the relationship between ketogenesis and gluconeogenesis were evaluated. Toward this end, differences in free fatty acid, triglyceride, acetoacetate, β-hydroxybutyrate, oxygen, carbon dioxide, glucose, lactose, pyruvate, glycerol and alanine concentrations between the splanchnic arteries and hepatic vein were determined. Although splanchnic production of both β-hydroxybutyrate and acetoacetate were equal (total of 115 g/24 hr), there was a relative predominance of β-hydroxybutyrate in the hepatic vein. This rate of hepatic ketogenesis was comparable to that previously noted after 5-6 weeks of starvation. Since the degree of peripheral hyperketonemia after 5-6 weeks of starvation was 3-fold greater, the rate of removal of ketone-bodies by peripheral tissues is probably as important as the rate of production in determining peripheral blood ketone levels. Splanchnic glucose release was 123 g/24 hr, a rate slower than that previously observed after an overnight fast but greater than that seen during prolonged starvation. Hepatic gluconeogenesis, as calculated from the sum of hepatic vein lactate, pyruvate, glycerol and amino acids was 99 g/24 hr, a value greater than that seen after either an overnight fast or prolonged starvation. The rate of hepatic ketogenesis showed a direct relationship to the rate of gluconeogenesis.

9068 HISTOCHEMICAL STUDIES OF HEPATIC ENZYMES IN DOGS SUBJECTED TO LOBAR BILE DUCT OBSTRUCTION. *(E.)*

Hagerstrand, I.; Nordén, J. G.; Ohlsson, E. G. (Malmo Gen. Hosp., Sweden). *Acta Chir. Scand.* 140(5):391-395, 1974.

Liver morphology and enzyme histochemical changes were studied in 12 dogs following surgical left lateral and medial lobar bile duct obstruction, and findings were compared to those in 8 dogs following sham abdominal operation. Biopsy specimens from obstructed lobes 4 weeks after surgery showed proliferation of connective tissue with bile ductile proliferation and occasional chronic inflammation. Obstructed lobes gradually atrophied. Glycogen content of obstructed hepatocytes as demonstrated by PAS-MacManus staining was decreased. No fatty changes of significance occurred. No changes occurred in intracellular succinic dehydrogenase, monoaminooxidase, lactic dehydrogenase and nonspecific esterase staining following bile duct obstruction. Changes, however, did occur in the intracellular distribution and/or intensity of reaction of glucose-6-phosphatase. Canalicular alkaline phosphatase activity was increased in liver biopsy specimens from both obstructed and nonobstructed lobes and was maintained at increased levels for at least 4 weeks. Serum alkaline phosphatase activity was also increased, reaching peak levels after 1 week but remaining elevated for 4 weeks.

9069 HEPATIC BLOOD FLOW CHANGES FOLLOWING INTRAVENOUS INFUSION OF VARIOUS SINGLE AMINO ACIDS IN DOGS. III. *(E.)*

Hallberg, D.; Soda, M. (Surg. Res. Lab., Karolinska Inst., Stockholm, Sweden). *Acta Chir. Scand.* 140(5):388-390, 1974.

Measurements were made of hepatic blood flow in 10 pentobarbital anesthetized dogs using an electromagnetic square wave flowmeter during i.v. infusion of single amino acids. The effects of 18 different amino acids (50 mM/liter) were studied during infusion into the femoral vein at a rate of 16 ml/min (total 100 ml). All amino acids tested increased both hepatic artery and portal vein blood flow. Compared to basal, preinfusion values, phenylalanine, threonine and arginine produced the greatest (26%) increase in portal vein blood flow while lysine, cysteine and tryptophan showed the least increase (about 13%). Histidine, isoleucine and glycine produced the greatest (16%) increase in hepatic artery blood flow. There was no systemic difference in the degree of effect between essential and non-essential amino acids. Systemic arterial blood pressure did not increase during the infusions. Possible mechanisms which may be responsible for these effects include amino acid induced release of glucagon, secretin or cholecystokinin, as well as a direct effect on vessel walls.

9070 STUDIES ON THE DIFFERENTIAL RESPONSE TO GLUCAGON CONCENTRATION ON GLUCONEOGENESIS IN ISOLATED HEPATOCYTES CONTAINING HIGH AND LOW GLYCOGEN.

(E.) Wagle, S. R. (Indiana Univ. Sch. Med., Indianapolis). *Biochem. Biophys. Res. Commun.* 59(4): 1366-1372, 1974.

The effect of various concentrations of glucagon on gluconeogenesis in isolated hepatocytes from fed and fasted Cox rats was studied. Approximately 5-7 μM of glucose was synthesized by fed rats when lactate (5mM), alanine (5mM), and pyruvate (5mM) were used as substrates. Addition of 10^{-12} M glucagon to the isolated hepatocytes stimulated gluconeogenesis, and a 2-fold increase was observed when glucagon concentration was increased to 10^{-10} M. No further stimulation was observed for an additional increase to 10^{-8} M. Glucagon also stimulated the incorporation of labeled lactate and alanine into glucose. In fasted rats glucagon at a concentration of 10^{-12} M had no effect on gluconeogenesis, while concentrations of 10^{-10} to 10^{-8} M stimulated gluconeogenesis by almost 2-fold. Addition of insulin (33 μU/ml) inhibited glucagon-stimulated gluconeogenesis in cells obtained from fasted rats but had no effect in cells obtained from fed rats. The initial cyclic AMP levels were 1.1 ± 0.2 pM/mg protein in fed cells, 2.5 ± 0.5 in fed cells exposed to 10^{-8} M glucagon, and 20.3 ± 5 for fasted cells with 10^{-8} M glucagon. These results show that glucagon is involved in gluconeogenesis in normal homeostasis where it functions without altering cyclic AMP levels as well as in the fasting state, where higher concentrations of this hormone are needed (with a simultaneous decrease in insulin levels) to increase cyclic AMP levels which in turn may control other anabolic processes. It was also observed that the addition of hyaluronidase along with collagenase to cell perfusions from fed rats significantly decreased intracellular glycogen levels. The initial liver glycogen level was 340 ± 60 μM glucose/g as compared to 220 ± 40 μM glucose/g for cells isolated with collagenase alone and 130 ± 35 μM glucose/g for cells isolated with collagenase and hyaluronidase.

9071 BIOSYNTHESIS OF MOLECULAR SPECIES OF PHOSPHATIDYLCHOLINES IN BILE, LIVER AND PLASMA OF RATS GIVEN $[1,1\text{-}^{2}H_{2}]$ ETHANOL.

(E.) Curstedt, T. (Karolinska Inst., Stockholm, Sweden). *Biochim. Biophys. Acta* 369(2):196-208, 1974.

The incorporation of deuterium into different positions of glucose in plasma, *sn*-glycero-3-phosphate in liver, and the glycerol moiety of individual molecular species of phosphatidylcholines in bile, liver, and plasma was studied. Bile fistula female Sprague-Dawley rats were given 0.5-1.5 ml of [1,1- H]ethanol diluted to 10% (weight/volume) in saline and administered i.p. once every hr for 2-24 hr. The distribution of deuterium between the different positions of the glycerol moiety of phosphatidylcholines was the same for all major molecular species in bile, liver and plasma. Deuterium excess, calculated for molecules synthesized *de novo*, was also the same for all molecular species studied and remained constant throughout the experiment. The mean excess was 9 atom% at C-1, 41 atom% at C-2, and 18 atom% at C-3 of the glycerol moiety. The deuterium-labeling at C-2 of the glycerol moiety of phosphatidylcholines was 2-3 times higher than that at C-2 of total hepatic *sn*-glycero-3-phosphate, indicating that a specific pool of *sn*-glycero-3-phosphate was used for the synthesis of phosphatidylcholines in bile, liver, and plasma and that this pool was closely coupled to ethanol oxidation. A comparison of the deuterium-labeling at C-3 of the glycerol moiety with that at C-1 and C-6 of glucose indicated that the major part of the glycerol moieties of phosphatidylcholines in bile, liver, and plasma was formed *via* a gluconeogenetic pathway. Calculated apparent half-life times for the glycerol moieties were different for individual molecular species and varied between 1 and 30 hr. Corresponding species in liver and bile had about the same apparent half-life times, with the exception of 1,2-dipalmitoylphosphatidylcholine which displayed a half-time for the liver that was 10 times longer than that for bile. The apparent half-life times of molecular species in plasma were about 40-50% longer than those of the corresponding species in liver. All of the major phosphatidylcholines in bile, liver and plasma, with the possible exception of the 1,2-dipalmitoyl species, appear to be derived from the same pool in the liver.

9072 THE IDENTITY OF GLUTATHIONE S-TRANSFERASE B WITH LIGANDIN, A MAJOR BINDING PROTEIN OF LIVER.

(E.) Habig, W. H.; Pabst, M. J.; Fleischner, G.; Gatmaitan, Z.; Arias, I. M; Jakoby, W. B. (Natl. Inst. Arthritis Metab. Dig. Dis., Bethesda, Md.). *Proc. Natl. Acad. Sci. USA* 71(10):3879-3882, 1974.

Evidence is presented that ligandin, an intracellula liver protein involved in the binding of such anions as bilirubin, idocyanine green, and penicillin, is identical to glutathione *S*-transferase B, an enzyme catalyzing the conjugation of glutathione with such electrophiles as 1-chloro-2,4-dinitrobenzene, 1,2-dichloro-4-nitrobenzene, iodomethane, ethacrynic acid, and bromosulfophtalein. Homogeneous preparations of glutathione transferase B and ligandin showed the same activity in conjugating these electrophiles with glutathione. Monospecific goat immunoglobulin G (IgG) obtained by immunization with ligandin yielded a single line of identity with transferase B and ligandin when tested by Ouchterlony immunodiffusion techniques or by immunoelectrophoresis. In the precipitin reaction, ligandin and transferase B reacted identically with antibody prepared against ligandin. Amino acid analyses of ligandin and transferase B (both proteins having a molecular weight of 45,000) were identical. Phenobarbital administratio (8 mg/100 g body weight s.c. for 10 days) to littermate Sprague-Dawley rats resulted in an increased activity of liver extracts with 1-chloro-2,4-dinitrobenzene, 1,2-dichloro-4-nitrobenzene, and iodomethane

:eatment of the rat liver extracts with antibody to
igandin and comparison of the remaining enzyme ac-
ivity after removal of precipitated protein with
iat of the same extract after treatment with normal
;G revealed increased activities for both trans-
erase B and ligandin in animals given phenobarbital.
inding activity experiments with indocyanine green,
ilirubin, and benzyl penicillin yielded similar re-
ılts for ligandin and transferase B. Because of
ıe effect of indocyanine green on the conjugation
f 1-chloro-2,4-dinitrobenzene it was concluded that
ıe dye is a competitive inhibitor of the reaction.
ince liver extracts contain at least 3 times as much
igandin as all other glutathione transferases com-
ined, it is postulated that the protein performs a
ıysiological role as a catalyst in addition to its
inding function in cellular transport.

)73 THE CONTROL OF FATTY ACID SYNTHESIS BY SUBSTRATE SUPPLY IN THE PERFUSED MOUSE VER.

(E.) Michael, D.; Salmon, W.; Hems, D. A.
ept. Biochem., Imperial Coll. Sci. Technol., Lon-
n, England). *Biochem. Soc. Trans.* 2(5):1011-1014,
74.

ntrol of fatty acid synthesis by substrate supply
s investigated in perfused livers of normal and
netically obese (ob/ob) female mice. The total
te of hepatic fatty acid synthesis was obtained
om the incorporation of ^3H from ^3H_2O into fatty
ids between 2 and 3 hr. The incorporation of ^{14}C
om ^{14}C-labeled precursors added to the medium pro-
ded a simultaneous measure of the contribution of
rbon from the precursor to the total utilized in
tty acid synthesis. An approximately constant
te of fatty acid synthesis was obtained when livers
om normal mice were perfused with initial glucose
ncentrations between 4 and 15 mM and was increased
higher glucose concentrations. Livers from ob/ob
ce (perfusate glucose initially 6 mM) did not show
increased accumulation of synthesized fatty acid
mpared to the livers of normal mice, until 3 hr
perfusion, by which time the perfusate glucose
d lactate concentrations had equilibrated at about
and 3 mM, resp. Rates of fatty acid synthesis in
vers from normal and ob/ob mice during the 3rd hr
perfusion were similar to those found in previous
vivo studies with ^3H_2O. The fraction of ^3H-la-
led fatty acid found in the medium after 3 hr of
rfusion was 0.25 ± 0.01 and 0.19 ± 0.07 of that
the liver for ob/ob and normal mice, resp. Ad-
tion of lactate to the medium (initially 10 mM)
perfusions in normal mice markedly altered the
pendence of fatty acid synthesis on glucose con-
ntration, such that a rate of 5.9 μM of fatty acid
nthesized/hr/g wet liver was found at 12-17 mM
ucose compared with 1.9 when lactate was omitted.
e presence of lactate at glucose concentrations
4-10 or 20-25 mM, however, exerted little effect
the rate of fatty acid synthesis. The contribu-
on of glucose carbon to the total utilized in
tty acid synthesis increased from 10% at 5 mM to
% at 25-32 mM. When lactate (10 mM) was present,
is precursor provided 25-50% of the carbon utiliz-
in fatty acid synthesis at all glucose concen-
ations. Entry of lactate to the liver may be important in the control of hepatic fatty acid synthesis in the ob/ob mouse.

9074 EFFECT OF PHENOBARBITAL ON CHOLINE UPTAKE IN THE ISOLATED PERFUSED RAT LIVER. *(E.)*

Sorrell, M. F.; Tuma, D. J.; Barak, A. J. (VA Hosp., Omaha, Nebraska). *Pharmacology* 11(6):365-372, 1974.

The effects of circulated phenobarbital and chronic phenobarbital administration on choline uptake and metabolism were studied in isolated perfused livers from Sprague-Dawley rats and Dunkin Hartley guinea pigs. Choline uptake in rat liver was reduced from 1.70 ± 0.16 to 0.9 ± 0.18 mg/g fresh liver 60 min after the addition of 0.5 mg/ml phenobarbital. Addition of the same amount of phenobarbital to perfused guinea pig liver resulted in a reduction in choline uptake from 0.70 ± 0.04 to 0.45 ± 0.47 after 60 min. The inhibitory effects of the drug were linearly dose-dependent. Pretreatment of rats with phenobarbital (50 mg/12 hr i.p. for 5 days) did not significantly affect the choline uptake mechanism in the liver. Radiorespirometric evaluation of the effect of phenobarbital on direct choline oxidation by the isolated perfused rat liver indicated that the drug inhibits the generation of $^{14}CO_2$ from labeled choline supplement during 3 hr of perfusion by approximately 37%, reflecting an inhibition of the choline oxidative pathway to this extent. The effects of phenobarbital on hepatic choline uptake appear to be inhibitory, yet reversible once the drug is removed. The inhibition of choline oxidation by phenobarbital may describe only 1 effect of the drug on hepatic choline uptake.

9075 ANALYTICAL SUBCELLULAR FRACTIONATION STUDIES ON HUMAN LIVER BIOPSIES. *(E.)*

Seymour, C. A.; Neale, G.; Peters, T. J. (Roy. Postgrad. Med. Sch., London, England). *Biochem. Soc. Trans.* 2(5):1101-1104, 1974.

Microanalytical subcellular fractionation techniques were applied to human liver biopsies. Enzyme activities for subjects with normal serum liver function tests and histologically normal liver were as follows: 5'-nucleotidase, 1.10 at pH 9; alkaline phosphatase, 0.918 at pH 9.5; leucyl-β-naphthylamidase, 0.817 at pH 6.8; γ-glutamyl transpeptidase, 2.93 at pH 8.5; *N*-acetyl-β-glucosaminidase, 2.02 at pH 5.7; acid phosphatase, 10.3 at pH 4.4; β-glucuronidase, 4.72 at pH 4.0; β-glucosidase, 0.374 at pH 5.8; and α-glucosidase, 0.391 mU/mg protein at pH 4.5. The distribution of marker enzymes for lysosomes (*N*-acetyl-β-glucosaminidase), peroxisomes (catalase), and mitochondria (malate dehydrogenase) in a human liver biopsy extract were also obtained. These 3 organelles were clearly resolved in the gradient, with the mitochondria (modal density 1.19) and peroxisomes (modal density 1.23) having similar properties to those of rat liver. The particulate activity showed a broad band with an ill-defined modal density at 1.17 as compared to a modal density of 1.23 for rat liver. *N*-Acetyl-β-glucosaminidase showed a complex distribution with much activity remaining in the sample layer. Other acid hydrolases and acid phosphatase had similar distributions to that of *N*-acetyl-β-glucosaminidase. The demonstration of latent and sedimentable acid hydrolase activities established biochemically the presence of lysosomes in the cell extracts. Distinct peaks of particulate activity were obtained for the membrane-bound enzymes. Alkaline phosphatase had a modal density similar to that of 5'-nucleotidase (1.13), but more of the former enzyme was found at higher densities in the gradient, indicating that the phosphatase is largely localized to the plasma membrane in liver. Protein was largely recovered in the sample layer. Leucyl-β-naphthylamidase showed significant amounts of activity in the sample layer and a broad distribution throughout the gradient. Peaks of activity corresponding to 5'-nucleotidase (plasma membrane), *N*-acetyl-β-glucosaminidase (lysosomal), and neutral α-glucosidase (microsomal) suggested a multi-organelle localization. γ-Glutamyl transpeptidase showed little soluble activity and a complex distribution pattern not conforming to any of the marker enzymes. Preliminary results from the application of these techniques to liver tissue from various hepatic diseases indicated a significant positive correlation between serum and tissue activities for enzymes predominantly localized to the plasma membranes.

9076 HISTOCHEMICAL DEMONSTRATION OF γ-GLUTAMYLTRANSPEPTIDASE IN RAT LIVER AFTER PORTACAVAL ANASTOMOSIS. *(E.)* Muller, E.; Colombo, J. P.; Peheim, E.; Bircher, J. (Anat. Inst., Univ. Zurich, Switzerland). *Experientia* 30(10):1128-1129, 1974.

The presence of γ-glutamyltranspeptidase (GGTP) in rat liver after portacaval anastomosis is histochemically demonstrated and compared to its distribution in fetal and neonatal rats. After portacaval shunt, the hepatocytes around the hepatic lobules showed the 1st signs of enzymatic activity, followed by liver cells between the periportal areas and the middle of the lobule. In the postnatal period, the enzyme was gradually localized towards the periportal areas of the lobuli, whereas at the 10th day after birth the activity was as low as in the adult rat. The enzyme fluctuation in the postnatal period and after deviation of portal blood supply can be understood in terms of the fine circulatory situation in the hepatic lobulus. Hepatocytes situated close to the axial terminal branches (vena portae and arteria hepatica propria) are the first to be supplied with fresh blood rich in oxygen and nutrients; these hepatocytes were also the last to stop synthesizing GGTP in the postnatal period and the first to resynthesize GGTP after portacaval shunt. Whether the high enzyme activity in shunted rats is due to the change in substrate or oxygen supply, or both, requires further investigation.

9077 A COMPARISON OF THE PHOSPHOFRUCTOKINASE ISOENZYME PROFILES OF TRANSPLANTABLE HEPATOMAS AND NORMAL LIVER. *(E.)* Kirby, W.; Morris, H. P.; Taylor, C. B. (Dept. Biochem., Univ. Sheffield, England). *Eur. J. Cancer.* 10(9):629-631, 1974.

Phosphofructokinase isoenzyme profiles of transplantable hepatomas with widely differing growth rates and states of differentiation and of normal liver preparations were studied to investigate whether forms of the isoenzyme not present in normal liver occur in hepatomas. The hepatoma material used was from Morris hepatomas 9618A, 16, and 7777 (highly differentiated, well differentiated, and poorly differentiated, resp.) and from Novikoff ascites hepatoma cells (very poorly differentiated). The total phosphofructokinase activity was similar in liver (2.8 U/g wet weight) and tumor 9618A (2.7 U/g), where the less well differentiated tumors 16 (4.5 U/g), 777 (7.8 U/g), and Novikoff cells (23 U/ 1 packed cells) showed progressively higher activities. All tumors showed differences in isoenzyme composition from that of the rat liver, but the changes were within the range of isoenzyme types found in the liver. Moreover, there was no obvious correlation between the change in the isoenzyme pattern and the degree of differentiation. No evidence of new forms of phosphofructokinase in tumors was thus found. When equivalent amounts of the kinase in supernatant fluid from tumors and whole liver were allowed to react with excess antiserum, raised against rat muscle phosphofructokinase, and the residual activity determined after centrifugation, greater proportions of kinase activity precipitated from the tumor were not found in comparison to supernatant activities from the liver. This was consistent with chromatographic results indicating that no muscle-type enzymes are produced by the tumors.

9078 CHANGES IN IN VIVO METABOLISM OF BILE ACID IN THE RAT AFTER TREATMENT WITH PHENOBARBITAL. *(E.)* Cronholm, T.; Einarsson, K.; Gustafsso J. A. (Dept. Chem., Karolinska Inst., Stockholm, Sweden). *Lipids* 9(11):844-849, 1974.

Phenobarbital was administered i.p. (100 mg/kg body weight/day) for 10 days to 3 of 6 male Sprague-Dawle rats to investigate the drug's effect on the pool size and turnover of i.p. administered 24-^{14}C-cholic acid (0.1 mg) and ^{3}H-chenodeoxycholic acid (0.5 mg) given at the end of the experimental period. The ph nobarbital-treated rats had a smaller cholic acid pool compared to control rats (6.08 ± 2.09 mg and 23.60 ± 7.66 mg, resp.), though the pool size of chenodeoxycholic acid, and its metabolites (α- and β-muricholic acids), was of the same magnitude for both groups. The daily production of cholic acid was also decreased in phenobarbital-treated rats compared to controls (2.12 ± 0.46 mg and 7.24 ± 1.66 mg resp.). No significant difference was observed between the synthesis of chenodeoxycholic acid in the 2 groups. The results support the view that various species and strains of mammals show differences in their ability to induce liver enzyme activities during drug treatment since, in contrast to the rat, ma and monkey increase the synthesis of bile acids during treatment with phenobarbital.

9079 AMINO ACID INCORPORATION INTO LIVER PROTEINS DURING EXTRAHEPATIC CHOLESTASIS IN THE RAT. *(E.)* Lundborg, H.; Hamberger, A. (Sahlgrenska Hosp., Goteborg, Sweden). *Eur. Surg. Res.* 6(2):95-109, 1974.

Liver tissue from cholestatic (bile duct ligation) and normal male Sprague-Dawley rats was incubated balanced salt media L-(4,5-^{3}H)-leucine or L-(U-^{14}C)-ucine to study *in vitro* incorporation of leucine to liver slice protein. The cholestatic liver owed a rate of amino acid incorporation which was proximately 3 times that of control liver. There s no apparent effect on the specific radioactivity the precursor. Protein radioactivity increased all subcellular fractions, with the largest inease (300%) being observed for the soluble proins. The microsomes showed a 50% increase in anals ligated for 12 days. Serum from control or olestatic animals and bile from control animals ded during incubation of liver slices had a small fect on leucine incorporation. Brain, kidney, d heart were studied in a similar way to investite whether the effect of cholestasis on protein nthesis was specific for liver. No marked effect amino acid incorporation was observed.

80 ROLE OF THE SODIUM PUMP IN THE REGULATION OF LIVER METABOLISM IN EXPERIMENTAL ALCOLISM.

(E.) Bernstein, J.; Videla, L.; Israel, Y. ept. Pharmacol., Univ. Toronto, Canada). *Ann. NY ad. Sci.* 242:560-572, 1974.

merous studies with rats are cited to show that ronic administration of ethanol leads to a hypertabolic condition of the liver. This hypermetalic state is produced by an increase in the activy of the sodium pump, which becomes the pacemaker r the oxidative metabolism of the hepatic cell. e increased sodium pump activity is correlated with increased activity of sodium- and potassium-activad ATPase. There also appears to be a marked decrease pump efficiency, such that more ATP is hydrolyzed to ve an equal number of ions. The permeability of the asma membrane to potassium also appears to be ineased. These 2 phenomena amplify the effect of an creased sodium- and potassium-activated ATPase on the te of cellular metabolism. Thus, chronic administraon of ethanol produces complex changes in the plasma mbrane of the liver cell. An increased activity of e sodium pump could result in an adaptive response compensate for the inhibitory action of ethanol sodium- and potassium-activated ATPase or it could a secondary effect in response to actions of ethol on other processes which might involve thyroid rmones and epinephrine. Thyroxine and epinephrine oduce a calorigenic effect in the liver that apars to be identical to that produced by long-term hanol administration.

31 THE 'CHESS BOARD' DISTRIBUTION OF GLYCOGEN IN LIVER. ARTIFACT OF FIXATION OR THE EFCT OF AN ENZYME?

(E.) Roos, R. (Anat. Inst., iv. Tubingen, Germany). *Histochem. J.* 6(5):511-1, 1974.

ver pieces (4 mm cubes) from adult SPF Spraguewley rats were fixed in Carnoy's fluid, Goland's xative, or Rossman's fixative and examined to dermine if the 'chessboard' pattern of glycogen disibution often observed after block-fixation of ver is due to the enzymatic breakdown of glycogen efore the fixative has reached the inner parts of the block) or to the plane of the section taken. Regardless of which fixation method was used, there was a central area of the section in which all the cells contained nearly equal amounts of glycogen. The area covered by this zone was inversely related to the width of the zone of localized glycogen. Periportal cells were filled with granular glycogen particles after all 3 fixation techniques, and in the region surrounding the central vein the intracellular glycogen was finely dispersed. Essentially the same glycogen distribution was found in liver perfused with *p*-chloromercuribenzoic acid which almost completely inhibits phosphorylase activity. The chessboard pattern was present in the center of surface sections, as in unperfused liver, while the central sections showed a homogeneous distribution of glycogen. The pattern appeared to be the result of the plane of sectioning passing through a region of intracellularly localized glycogen where some regions of a cell contain glycogen while other regions of other cells in the same plane do not.

9082 EFFECT OF BETA RECEPTOR BLOCKADE ON LIVER INJURY INDUCED BY CARBON TETRACHLORIDE.

(E.) Szlamka, I.; Kovach, A. G. B.; Somogyi, J.; Menyhart, J. (Semmelweis Univ. Med. Sch., Budapest, Hungary). *Acta Physiol. Acad. Sci. Hung.* 43(3):269-274, 1973.

The effect of the beta blocking agent, propranolol (2 X 10^{-2} g/100 g body weight i.p. hourly for 6 or 24 injections), was studied on the elevation of plasma free fatty acid and on fatty infiltration of the liver of rats induced by a single injection of CCl_4 (0.25 ml/100 g). Prior administration of propranolol prevented both the rise in plasma free fatty acid and hepatic fatty infiltration following CCl_4. Propanolol, however, had no effect on CCl_4-induced decreases in either the ratio of activity of bound to free lysosomal acid phosphatase or in the activity of glucose-6-phosphatase in liver homogenates. These results indicate that propranolol inhibits lipolysis in adipose tissue thus preventing the CCl_4-induced free fatty acid rise in plasma. It is concluded that the rise in plasma free fatty acid plays a permissive role in the initiation of fatty changes in the liver.

9083 ALKALINE PHOSPHATASE IN AUXILIARY LIVER TRANSPLANTATION.

(E.) Jersky, J. (Dept. Surg., Univ. Witwatersrand, Johannesburg, South Africa). *Gut* 15(8):636-643, 1974.

Auxiliary liver allografts were placed into baboons and allowed to undergo rejection during which time the incorporation of ^{14}C-leucine into alkaline phosphatase was measured in both host and donor livers by an antialkaline phosphatase antibody assay. Initial alkaline phosphatase activity was 1.4 to 4.8 King-Armstrong U/g liver. Following transplantation, serum alkaline phosphatase as well as transaminase activity increased several-fold. Although increased transaminase levels were due to release from damaged cells, increased alkaline phosphatase levels were associated with enhanced activity in both host and transplanted livers as well as in the bile from host livers. Kinetic and starch-gel electrophoretic studies confirmed that the alkaline phosphatase was of hepatic origin. Leucine injected i.v. was incorporated into alkaline phosphatase of both donor and host livers. Enhanced alkaline phosphatase synthesis continued in host livers following removal of previously transplanted donor livers. In both cases, the enhanced hepatic alkaline phosphatase synthesis was accompanied by increased biliary excretion of the enzyme.

9084 ANTIGEN OF MOUSE BILE CAPILLARIES AND CUTICLE OF INTESTINAL MUCOSA.

(E.) Khramkova, N. I.; Beloshapkina, T. D. (N. F. Gamaleya Inst. Epidemiol. Microbiol., Moscow, USSR). *Nature (Lond.).* 251(5476): 627-628, 1974.

A bile capillary-cuticular antigen (BCCA) apparently synthesized at the cell surface was identified in bile capillaries of mouse liver and in the cuticle of the intestinal mucosal epithelial cells. Gel double diffusion and immunoelectrophoresis analyses of Triton X-100 fractions of mouse liver cell ghosts and whole mouse liver cells revealed 6 antigens in all Triton fractions studied. The antigens were presumably membrane antigens. One of the antigens, called bile capillary-cuticular antigen, was regularly found in each liver Triton fraction, whereas the other 5 antigens were detected in only some of the fractions. Immunoprecipitation and indirect immunoautoradiographic studies of the distribution of BCCA in different mouse organs and in ascitic hepatoma 22-a showed BCCA to be a dominant antigenic component of liver cell and ghost fractions and to exist in considerable amounts in mouse kidney. BCCA was determined in ascitic hepatoma 22-a only by immunoautoradiography. The antigen was not detected by either method in concentrated saline extracts of mouse liver, kidney, spleen, or intestine. Indirect immunofluorescence cell localization studies of BCCA revealed a distinct bright fluorescence on the liver cell surface surrounding the bile capillaries between 2 hepatocytes. The fluorescence of bile capillaries disappeared after the absorption of monospecific antibodies to BCCA with a partially-purified BCCA-containing electrophoretic fraction. In sections of the intestine, the monospecific antibodies to BCCA stained the cuticle of the mucosal epithelial cells of villi and crypts. This distinct cuticular fluorescence was observed for the entire length of the intestine from the duodenum to the rectum. Small amounts of BCCA or an antigen with a similar determinant were also found on the plasma membrane of each liver cell. The absence of BCCA in the cytoplasm of liver cells suggested that its synthesis occurs on the cell surface.

9085 HORMONAL CONTROL OF LIVER REGENERATION.

(E.) Thrower, S.; Ord, M. G. (Dept. Biochem., Univ. Oxford, England). *Biochem. J.* 144(2): 361-369, 1974.

The effects of various drugs on ornithine decarboxylase induction, cyclic AMP production, and factors associated with DNA production were studied in partially hepatectomized male Wistar rats maintained on strict feeding and lighting schedules. Two peaks in cyclic AMP production in rat livers 2 and 12 hr after partial hepatectomy were confirmed and a 3rd was established at 22 hr which was the peak of DNA synthesis. Increases in cyclic AMP were prevented by the β-adrenergic blocking agents propranolol (10 mg/kg i.p.) and pindolol (0.5 and 1.0 mg/kg i.p.) without affecting ornithine decarboxylase induction or DNA synthesis. The α-blocking agents phenoxybenzamine (5 mg/kg i.p.) and phentolamine (10 mg/kg i.p.), given at the time of partial hepatectomy, delayed the rise in ornithine decarboxylase normally found 4 hr after surgery but did not affect DNA synthesis. The onset of DNA synthesis was delayed, however, if the α-blocking agents were given at 9-12 hr or at 18 hr. Phenoxybenzamine (5 mg/kg i.p.) did not affect the induction of ornithine decarboxylase by glucagon or growth hormone in intact rat livers but did inhibit induction by dexamethasone (0.1 and 0.5 mg/kg i.p.). The induction of ornithine decarboxylase produced by dexamethasone was inhibited by 17α-hydroxyprogesterone (50 mg/kg i.p.); this compound also blocked the induction of ornithine decarboxylase in livers of partially hepatectomized rats. The sensitivity of liver regeneration to phenoxybenzamine, phentolamine, and 17α-hydroxyprogesterone suggests that norepinephrine and glucocorticoids in rats may be implicated in inducible protein synthesis after surgery, though factors leading to the periodicity in cyclic AMP concentrations and in protein induction are not yet understood.

9086 SIMULTANEOUS HEPATIC MICROSOMAL OXIDATION OF p-NITROANISOLE AND GLUCURONIDE CONJUGATION OF p-NITROPHENOL.

(E.) Ranklin, M. R. (Coll. Med., Univ. Utah, Salt Lake City). *Biochem. Soc. Trans.* 2(5):891-894, 1974.

The simultaneous hepatic microsomal oxidation of *p*-nitroanisole and glucuronide conjugation of *p*-nitrophenol was studied in hepatic microsomal fractions from phenobarbital-pretreated rats (80 mg/kg/day for 4 days) to determine whether on-going conjugation of the product of oxidative metabolism increased the oxidative reaction *in vitro*. The rates of glucuronide conjugation of *p*-nitrophenol increased with increasing *p*-nitrophenol concentrations. There was also a decreased conjugation rate in the absence of *p*-nitroanisole. Product inhibition of *p*-nitroanisole demethylation with increasing concentrations of *p*-nitrophenol was readily apparent. The apparent disappearance of *p*-nitrophenol by glucuronide conjugation was slowed by the addition of reduced nicotinamide adenine dinucleotide phosphate (NADPH) which caused the formation of additional *p*-nitrophenol from *p*-nitroanisole. The difference between the rates of these 2 reactions (the apparent rate at which *p*-nitrophenol was being generated by oxidative dealkylation of *p*-nitroanisole) was found to be higher at all concentrations of *p*-nitrophenol than the rate observed in the absence of on-going conjugation, suggesting that on-going conjugation speeds up oxidative dealkylation. An alternative explanation became evident, however, when the experiment was performed in the absence of *p*-nitronisole. The conjugation rate of *p*-nitrophenol was nhibited on the addition of NADPH and this inhibi- ion (about 20%) was essentially independent of *p*- itrophenol concentrations. Assuming an unchanged lealkylation rate, then subtraction of the *p*-nitro- henol formation rate from its rate of removal in the resence of the nucleotide gives a conjugation rate hich when subtracted from the original rate observ- d amounts to the inhibition of conjugation caused y the reduced nucleotide. The value agrees well ith those observed for reactions in the absence of -nitroanisole, and it is concluded that on-going onjugation of the oxidative metabolism product does ot increase the oxidative reaction rate *in vitro*.

087 A ^{99m}Tc-LABELED REPLACEMENT FOR ^{131}I-ROSE BENGAL IN LIVER AND BILIARY TRACT STUDIES. *E.)* Lin, T. H.; Khentigan, A.; Winchell, H. S. Medi-Physics, Inc., Emeryville, Calif.). *J. Nucl. ed.* 15(7):613-615, 1974.

tudies on dogs and rodents have enabled the develop- ent of a ^{99m}Tc-labeled "Hepato-Biliary Scintigraphin" gent which may replace ^{131}I-rose bengal in liver and iliary tract studies. The new agent shows an ini- ial, rapid clearance from plasma by the liver, sug- esting close to a 100% hepatic extraction efficiency. he substance is excreted into the bile and engages n a liver-plasma feedback system, the net effect of hich is a rapid, near quantitative excretion of ac- ivity into the bile. Assessment of activity by cintigraphy shortly after i.v. administration of the ^{9m}Tc agent yields images comparable to those ob- ained with ^{99m}Tc-colloids except that there is no ctivity in the spleen. Subsequent serial scinti- hotos enable measurement of the regional capacity f liver to excrete the ^{99m}Tc agent into bile and herefore allows for high-resolution scintigraphic maging of gallbladder and biliary tract morphology nd function.

088 LIPID PEROXIDATION IN CHRONIC ETHANOL TREATED RATS: IN VITRO UNCOUPLING OF EROXIDATION FROM REDUCED NICOTINE ADENOSINE DINU- LEOTIDE PHOSPHATE OXIDATION. *(E.)* Koes, M.; Ward, .; Pennington, S. (Cancer Res. Ctr., Columbia, Mo.). *ipids* 9(11):899-904, 1974.

n vivo and *in vitro* experiments with chronic eth- nol-treated Holtzman rats were performed to verify hat chronic ethanol exposure induces various com- onents of the microsomal ethanol oxidizing system nd to determine if the induced microsomal system akes contribution to ethanol metabolism *in vivo* uch that lipid peroxidation might be expected to ccur. The inducibility of various intermediates f the microsomal ethanol oxidizing system was con- irmed in ethanol-treated animals. A lipid peroxi- ation (measured as malonaldehyde formation) associ- ted with ethanol metabolism by microsomal prepara- ions was also demonstrated. Alcohol dehydrogenase evels were not influenced by prior exposure to eth- nol, whereas cytochrome P-450 and reduced nicotine denosine dinucleotide phosphate (NADPH) were ele- ated (males more than females). Blood ethanol clearance studies following an intoxicating dose (6 g/kg) of ethanol to 20 female rats (5 controls, 5 controls treated with pyrazole, 5 chronic ethanol treated, and 5 chronic ethanol treated also receiving pyrazole) showed that ethanol treated animals cleared alcohol faster than controls. A comparison between control and ethanol induced animals treated with pyrazole indicated that the ethanol treated animals cleared 20% of the 8-hr reference level while controls actually had more ethanol at 16 and 24 hr. Both groups had comparable pyrazole clearing rates. *In vitro* studies with isolated microsomes in a system similar to the assay media for NADPH oxidase to test the coupling between NADPH oxidase and the generation of malonaldehyde revealed elevated levels of the aldehyde in microsomes from ethanol-treated animals along with the appearance of peroxidized materials in the solution following the addition of substrate for the NADPH oxidase enzyme. This indicated that NADPH oxidation lies near the rate determining step for the formation of peroxidized lipid in the microsomal preparations. Low concentrations of azide uncoupled the lipid peroxidation from the microsomal NADPH oxidase activity.

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9141 CLEARANCE AND BIOLOGIC HALF-LIFE AS INDICES OF INTRINSIC HEPATIC METABOLISM. *(E.)* Perrier, D.; Gilbaldi, M. (Sch. Pharm., State Univ. New York, Buffalo). *J. Pharmacol. Exp. Ther.* 191 (1):17-24, 1974.

9142 HEPATIC EXTRACTION AND METABOLISM OF METHADONE AND OTHER NARCOTICS BY THE PERFUSED RABBIT LIVER. *(E.)* Kreek, M. J.; Rothschild, M. A.; Bowen, D.; Oratz, M.; (VA Hosp., New York, N.Y.). *Gastroenterology* 67(4):805, 1974.

9143 RELATION BETWEEN THE INDUCTION OF HYDROXYLATION AND OF GLUCURONIDATION IN CHICK LIVER. *(E.)* Burchell, B.; Wishart, G. J.; Dutton, G. J. (Med. Sci. Inst., The Univ., Dundee, Scotland). *FEBS Lett.* 43(3):323-326, 1974.

9144 A LIVER PROTEIN FACTOR AND DRUG METABOLIZING ENZYMES RESPONSIBLE FOR HYDROXYLATION OF 2-AMINOBENZOYL DERIVATIVES. *(Jap.)* Ishiguro, I.; Shinohara, R.; Ishikura, A.; Naito, J. (Gifu Coll. Pharm., Japan). *J. Pharm. Soc. Jap.* 94(10): 1240-1245, 1974.

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ACETALDEHYDE ON FATTY ACID OXIDATION AND
TOGENESIS BY HEPATIC MITOCHONDRIA. *(E.)* Rubin,
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9164 WHY DOES TESTICULAR ATROPHY OCCUR IN ALCOHOLICS? *(E.)* Van Thiel, D. H.; Gavaler, J. S.; Lester, R. (Univ. Pittsburgh, Sch. Med., Pa.). *Gastroenterology* 67(4):832, 1974.

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9166 THE SPECIFIC ACTIVITIES OF HEPATIC NUCLEAR ENDODEOXYRIBONUCLEASES AS INFLUENCED BY ADMINISTRATION OF CARBON TETRACHLORIDE AND PARTIAL HEPATECTOMY. *(E.)* Kempff, P. G.; Pitout, M. J.; Van Rensburg, S. J. (South African Med. Res. Council, Pretoria). *S. Afr. J. Sci.* 70(7):205-208, 1974.

9167 THE TOXICITY OF TWO SYNTHETIC 3-SUBSTITUTED FURAN CARBAMATES. *(E.)* Seawright, A. A.; Mattocks, A. R. (no affil.). *Food Cosmet. Toxicol.* 12(4):583-584, 1974.

9168 SUBCELLULAR REACTIONS OF ACROLEIN. *(E.)* Munsch, N.; de Recondo, A. M.; Frayssinet, C. (no affil.). *Food Cosmet. Toxicol.* 12(4):578-579, 1974.

9169 SOME INTER-RELATIONSHIPS BETWEEN VITAMIN C (L-ASCORBIC ACID) AND MERCURY IN THE GUINEA-PIG. *(E.)* Blackstone, S.; Hurley, R. J.; Hughes, R. E. (Univ. Wales Inst. Sci. Tech., Cardiff). *Food Cosmet. Toxicol.* 12(4):511-516, 1974.

See also, 8986, 8998, 9204, 9391, 9485, 9537.

SECRETION AND METABOLISM

Intestine

9170 ROLE OF ORAL INTAKE IN MAINTENANCE OF GUT MASS AND DISACCHARIDE ACTIVITY. *(E.)*

Levine, G. M.; Deren, J. J.; Steiger, E.; Zinno, R. (Philadelphia VA Hosp., Pa.). *Gastroenterology* 67(5):975-982, 1974.

To distinguish between lack of oral intake and negative nitrogen balance as the cause of small intestinal atrophy, i.v. alimentation was used to maintain 1 group of male Sprague-Dawley rats in positive nitrogen balance while they received no oral intake. A second group received an equal volume (50-60 ml/day for 1 week) of the same elemental diet *ad libitum*. All animals received in excess of 400 mg N_2/kg/day, and were in positive N_2 balance after 1 to 2 days of i.v. alimentation. After 7 days of i.v. or p.o. alimentation, the animals were sacrificed and the small intestine removed. Decreases in gut weight (22%), mucosal weight (28%), mucosal protein (35%), DNA (25%), and mucosal height were observed in i.v. alimented rats, primarily due to a decrease in these parameters in the proximal small bowel. As a result of the atrophy and hypoplasia of the proximal gut, the proximal to distal gradient of mass, protein, and DNA observed in p.o.-alimented rats was minimal in i.v.-alimented rats. I.v.-alimented rats had lower total intestinal maltase (62%), sucrase (62%), and lactase (44%), with a 46% decrease in maltase and sucrase specific activities, but without a change in lactase specific activity. Sucrase and maltase activities (specific activity and per cm) were highest in the jejunum of both groups, although they were higher in p.o.-alimented rats than in i.v.-alimented rats. Lactase activity/cm was greater in p.o.-alimented rats, reflecting the greater protein content, but without a change in specific activity.

9171 MESENTERIC VASOMOTOR EFFECTS OF VASOACTIVE INTESTINAL POLYPEPTIDE. STUDY ON PERFUSED ISOLATED CANINE JEJUNAL LOOPS. *(E.)*

Kachelhoffer, J.; Eloy, M. R.; Pousse, A.; Hohmatter, D.; Grenier, J. F. (Natl. Inst. Health Med. Res., Strasbourg, France). *Pfluegers Arch.* 352(1):37-46, 1974.

The vasomotor effect of vasoactive intestinal polypeptide (VIP) on the mesenteric vascular bed was studied in 15 dogs of both sexes in which the isolated jejunal loop was perfused *ex vivo* at normothermia, under pulsatile flow with heparinized, oxygenated and non-recirculating whole blood. VIP was administered either by intraarterial injections lasting 1 min with a flow rate of 1 ml/min or by intraarterial infusions of 10 min at the same flow rate. The 1 min injections established a dose-response relationship for injected doses between 10 ng/ml and 200 μg/ml. The results showed that VIP dilated the mesenteric vascular bed. This effect appeared dose-dependent up to concentrations of about 5 μg/ml of blood, value for which a maximal vasodepressor effect of 15 mm Hg ± 6 was reached. During long term infusions of VIP, the arterial pressure under constant flow returned toward the resting level despite continued stimulation. During the induced vasodilating period, O_2 consumption was increased. Neither propranolol (10, 50, 100, or 250 μg/ml) nor atropine (25, 100 and 250 μg atropine sulfate/ml) suppressed the vasodepressor effect of VIP. Therefore, a neuronal pathway does not seem to be involved. The experimental procedures used give no evidence for a significant physiological role of VIP in local regulation of mesenteric hemodynamics.

9172 ISOLATION OF MICROVILLUS PLASMA MEMBRANES FROM SUCKLING-RAT INTESTINE. THE INFLUENCE OF PREMATURE INDUCTION OF DIGESTIVE ENZYMES BY INJECTION OF CORTISOL ACETATE. *(E.)*

Galand, G.; Forstner, G. G. (Toronto Western Hosp., Canada). *Biochem. J.* 144(2):293-302, 1974.

To investigate membrane changes which might be involved after cortisone administration, a method for the isolation of a fraction enriched with microvillus plasma membrane was developed in suckling rats. Plasma-membrane fractions from 13-day-old control rats were compared with those from 13-day-old littermates given cortisol acetate by s.c. injection on postnatal day 10 (5.0 mg/100 g body weight), day 11 (2.5 mg/100 g) and day 12 (2.5 mg/100 g). Membrane proteins were solubilized by papain or sodium dodecyl sulfate, separated by polyacrylamide-gel electrophoresis, and assayed for enzyme activity. After cortisol injection, the activity of maltase, trehalase, sucrase, and leucyl β-naphthylamidase increased markedly, and to the same extent, in intestinal homogenates and plasma-membrane preparations. Purification and recovery of 5 marker enzymes with respect to homogenate activity, and recovery of protein, were similar for both membrane preparations, particularly after correction for non-membrane activity, which was high in suckling rats and affected by cortisol. In material released from the plasma membrane by digestion with papain, maltase protein was increased after cortisol injection at least as much as maltase activity. Sucrase activity increased at least 200-fold and this increase was associated with the appearance of a new sucrase band on polyacrylamide-gel electrophoresis. Sodium dodecylsulfate electrophoresis of plasma-membrane proteins revealed at least 4 additional macromolecules after cortisol injection. Concurrently several proteins disappeared from the plasma membrane. The added proteins appeared in general to be removed from the plasma membrane by papain, whereas the deleted proteins were in the papain-resistant fraction. Enzymic stimulation induced by cortisol acetate in the suckling-rat plasma membrane appeared to involve the addition of new proteins, rather than activation of proteins *in situ*. Deletion of proteins from the membrane during induction of hydrolytic enzymes may reflect other phenomena such as protein reorganization associated with the change in microvillus shape.

9173 EFFECT OF PROLONGED FASTING ON FATTY ACID RE-ESTERIFICATION IN RAT INTESTINAL MUCOSA. *(E.)*

Powell, G. K.; McElveen, M. A. (Univ. Texas Med. Branch, Galveston). *Biochim. Biophys. Acta* 369(1):8-15, 1974.

he effect of fasting on the absorption and transport f fat by the small intestine was studied in male oltzman rats. The animals were fasted for 60 hr; hey were then sacrificed, the intestine removed, omogenized, and analyzed for disaccharidase activity, onoacylglycerol acyltransferase, and protein. The asted rats had lost an average of 65 g (22% of ini- ial weight) and showed decreases in total intestinal ucosal protein, mucosal weight, sucrase, maltase and onoacylglycerol acyltransferase activities. Total icrosomal protein was decreased to a lesser degree n fasted rats, and total lactase activity remained nchanged. Specific activities of sucrase and mal- ase were unchanged by fasting; specific activity of actase increased. Specific activity of monoacylgly- erol acyltransferase/mg microsomal protein decreased. hen activity of this pathway was expressed per mg of ucosal protein or mucosal weight it remained unchanged n fasted animals. The results appeared consistent ith the hypothesis of decreased cell proliferation n starvation. An increase in the proportion of ounger differentiated cells in the epithelial cell opulation was also noted.

174 SOLUBLE NEUTRAL AND ACID MALTASES IN THE SUCKLING-RAT INTESTINE. *(E.)* Galand, G.; orstner, G. G. (Toronto Western Hosp., Canada). *iochem. J.* 144(2):281-292, 1974.

he separation of soluble maltase activity into 2 omponents was investigated in Wistar rats. he small intestine of suckling rats killed at 13 ays and of adult rats killed at 40 days were re- oved and homogenized and the homogenate centrifuged t 100,000 g for 1 hr to separate soluble from in- oluble membrane-bound enzymes. The supernatant rom 13-day-old rats contained 43.5% of the total ntestinal maltase activity, compared with 7.1% in he 40-day-old rats. The soluble maltase activity as separated on Sepharose 4B into 2 quantitatively qual fractions at pH 6.0, one containing a maltase ith a neutral pH optimum and the other a maltase ith an acid pH optimum. The neutral maltase was a altase-glucoamylase identical with membrane-bound altase-glucoamylase in molecular weight, heat-sen- itivity, substrate specificity, K_m for maltose and i for Tris. The soluble enzyme was induced by ortisol but the ratio of the soluble to bound en- yme fell during induction. Solubility of the neu- ral maltase was not accounted for by the action of ndogenous proteinases under the preparative condi- ions used. It is postulated that the soluble neu- ral maltase is a membrane-dissociated form of the ound enzyme and that the relation between these 2 orms is modulated by cortisol. The acid maltase enerally resembled acid maltase of liver, muscle and kidney. It was shown to a maltase-glucoamylase ith optimal activity at pH 3.0, and molecular eight of 136,000 by density-gradient centrifuga- ion. At pH 3.0 its K_m for maltose was 1.5 mM. It as inhibited by turanose and Tris but not by *p*- hloromercuribenzoate or EDTA. Some 55% of its activity was destroyed by heating at 50 C for 10 min. The acid maltase closely resembled β-glucuronidase and acid β-galactosidase in its distribution in the intestine, response to tissue homogenization in various media, and decrease in activity with cortisol treatment and weaning, indicating that it is a typical lysosomal enzyme concentrated in the ileum.

9175 DIGESTION OF PROTEIN IN SMALL AND LARGE INTESTINE OF THE PIG. *(E.)* Holmes, J. H. G.; Bayley, H. S.; Leadbeater, P. A.; Horney, F. D. (Dept. Nutr., Univ. Guelph, Canada). *Br. J. Nutr.* 32(3):479-489, 1974.

The total amounts of amino acids passing from the small intestine were compared with the amounts lost in the feces of 6 male pigs. The animals were fitted with re-entrant ileal cannulas and fed 1 kg dry matter/day, at 9 and 16 hr, with 1 of the following semi-purified diets: 1) soya-bean meal (SBM); 2) rapeseed meal (RSM); or 3) protein-free meal. Flow rates of ileal contents for 24 hr collection periods were 3135, 3127, and 1243 ml for SBM, RSM and protein-free diets, resp. Amounts of dry matter digested in the small intestine were 730, 669, and 809 g/day for SBM, RSM and protein-free diets, resp. Intake of N_2 was 32.6, 29.9, and 5.9 g/day, and the amount digested in the small intestine was 25.7, 20.2, and 1.6 g/day for SBM, RSM, and protein-free diets, resp. Amounts digested in the large intestine were 2.6, 3.7, and 0.7 g/day. Total amino acid intakes and amounts collected at the ileum and in the feces were (g/day): SBM, 177, 24, and 18; RSM, 149, 28, and 22; protein-free, 3, 9, and 12. Digestibility in the small intestine was higher for SBM than RSM for 17 of 18 amino acids, determined by ion-exchange chromatography. Greater quantities of arginine, methionine, cystine, and tyrosine were voided in the feces than passed through the ileal cannulas for pigs receiving the SBM and RSM diets. For those receiving the protein-free diet this was true for each amino acid except proline. Significant differences were found between all diets in the concentration of some amino acids in ileal and fecal amino-N, and endogenous protein secretions did not mask the differences between diets. Differences in digestibility between SBM and RSM were greater at the ileum than in the feces. Amino acid fermentation in the large intestine obscured or reduced differences between SBM and RSM. It was concluded that for SBM and RSM, 9% and 16% of nitrogen absorption, and 4% and 5% of amino acid disappearance, resp., may occur as a result of deamination and absorption in the large intestine.

9176 THE EFFECTS OF DISTENTION AND OBSTRUCTION ON THE ACCUMULATION OF FLUID IN THE LUMEN OF SMALL BOWEL OF DOGS. *(E.)* Mishra, N. K.; Appert, H. E.; Howard, J. M. (Med. Coll. Ohio, Toledo). *Ann. Surg.* 180(5):791-795, 1974.

The effects of distention and obstruction on the proximal and distal small intestine were studied in 42 dogs. Short-term distention was studied in 8 fasting dogs with jejunal ligations 10 cm below the ligament of Treitz. None of the 4 which initially had no proximal fluid showed fluid accumulation. Of the other 4 which initially did have proximal fluid, 2 showed a marked fluid accumulation during the 2 hr of distention. The other 2 showed no appreciable fluid accumulation with distention. Long-term distention was studied in 24 dogs with proximal ligations. Vomiting occurred in less than 50% and none had either proximal or distal distention after 24 to 96 hr of distention although the probability of finding fluid was directly related to the duration of distention. Long- and short-term closed loop obstruction also had little effect on fluid accumulation or distention. Distention pressures of 25 cm water tended to reduce fluid accumulation within the intestinal lumen. If these findings can be extrapolated to man, they may indicate that intraluminal fluid accumulation in the obstructed small bowel may be due to alterations in the blood supply rather than to obstruction *per se*, or to accumulated proximal small bowel fluid.

9177 LIPID COMPONENTS OF TWO DIFFERENT REGIONS OF AN INTESTINAL EPITHELIAL CELL MEMBRANE OF MOUSE. *(E.)* Kawai, K.; Fujita, M.; Nakao, M. (Tokyo Med. Dental Univ., Japan). *Biochim. Biophys. Acta* 369(2):222-233, 1974.

The microvillus membrane and the basolateral membrane of the small intestine of ICR strain mice maintained on an enriched artificial diet originally designed for the enhancement of reproduction, and of dd strain mice fed a simple growth diet, were analyzed for lipid composition. Microvillus membranes were rich in cholesterol and glycolipids but poor in phospholipids as compared with basolateral membranes and other types of plasma membranes. The total lipid content/100 mg protein was 61.5 mg in microvillus membranes and 95.2 mg in basolateral membranes. The microvillus membrane contained 16.0 mg of phospholipids and 29.0 mg of glycolipids/100 mg protein. The basolateral membrane contained 58.6 mg of phospholipids and 12.4 mg of glycolipids/100 mg protein. The molar ratio of cholesterol, phospholipid and glycolipid was 1/1/1 in microvillus membranes and 1/2.5/0.3 in basolateral membranes. Cholesterol and free fatty acids were the major neutral lipids in both membranes. Phosphatidylethanolamine and phosphatidylcholine were the major phospholipids in both membranes. Palmitic, stearic, and linoleic acids were the major fatty acid components determined in both membranes from the IRC strain. The basolateral membrane contained a little more palmitic acid and a little less stearic acid than the microvillus membrane. In both membranes the major glycolipids were ceramide monohexoside and hexosamine probably derived from globoside-type glycolipids.

9178 THE MEASUREMENT OF CELL PRODUCTION RATES IN THE CRYPTS OF LIEBERKUHN. AN EXPERIMENTAL AND CLINICAL STUDY. *(E.)* Wright, N.; Watson, A.; Morley, A.; Appleton, D.; Marks, J.; Douglas, A. (Dept. Pathol., Univ. Newcastle upon Tyne, England). *Virchows Arch.* [*Pathol. Anat.*] 364(4):311-323, 1974.

A method was developed for assessing the proliferative state in the small bowel mucosa in both animal and man, using the metaphase-arresting (stathmokinetic) properties of vincristine. In male albino Wistar rats a value for the migration of 1.78 cell positions/hr was obtained by the stathmokinetic method. This value was in agreement with a measurement of the migration rate made using tritiated thymidine. Values for the transit time through the crypt (34 hr) and for the cell production rate (39 cells/crypt/hr) were in good agreement with previously published values. A male 37-yr-old patient with a 10-yr history of dermatitis herpetiformis and a control patient were also studied by the vincristine technique. The patient with dermatitis herpetiformis had the flat mucosa of gluten-sensitive enteropathy. At 11 hr vincristine sulfate was rapidly infused i.v. in a dose of 0.045 mg/kg body weight. At 13.30 hr a Crosby capsule was fired and a mucosal biopsy obtained. The biopsies were spread flat under a stereomicroscope, fixed for 48 hr, serial paraffin sections cut at a thickness of 3 μcm and stained with hematoxylin, and the cells counted by standard methods. The migration and cell production rates were markedly increased in the flat mucosae. A hyperproductive proliferative state is therefore confirmed in the flat mucosa of untreated gluten-sensitive enteropathy. The results indicate that the vincristine technique is applicable to studies involving intestinal cell kinetics.

9179 EFFECT OF MUCIN ON THE BIOAVAILABILITY OF TETRACYCLINE FROM THE GASTRO-INTESTINAL TRACT: IN VIVO, IN VITRO CORRELATIONS. *(E.)* Barry, B. W.; Braybrooks, M. P. (Sch. Pharm., Portsmouth Polytechnic, England). *J. Pharm. Pharmacol.* 26(12): 64P-65P, 1974.

9180 MULTIPLE LIGAND BINDING SITES AT THE MUSCARINIC RECEPTOR OF THE GUINEA PIG ILEUM. *(E.)* Kuhnen-Clausen, D. (Inst. Aerobiol., Grafschaft, Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 282 (Suppl.):R53, 1974.

9181 BINDING OF CHOLERA TOXIN TO MUCINS AND INHIBITION BY GASTRIC MUCIN. *(E.)* Strombeck, D. R.; Harrold, D. (Sch. Vet. Med., Univ. California, Davis). *Infect. Immun.* 10(6):1266-1272, 1974.

9182 GRANULE RELEASE OF ENTEROCHROMAFFIN (EC) CEL BY CHOLERA ENTEROTOXIN IN THE RABBIT. *(E.)* Fujita, T.; Osaka, M.; Yanatori, Y. (Niigata Univ. Sch Med., Japan). *Arch. Histol. Jap.* 36(5):367-378, 1974.

9183 COMPARATIVE FLUX MEASUREMENTS OF DIFFUSING, ACTIVELY ABSORBED AND ACTIVELY SECRETED SUBSTANCES ON THE ISOLATED MUCOSA OF GUINEA PIG SMALL INTESTINE. *(E.)* Lauterbach, F. (Inst. Pharmacol. Toxicol., Ruhr Univ. Bochum, Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 282(Suppl.):R55, 1974.

9184 EFFECT OF SECRETION ON ELECTRICAL ACTIVITY OF THE SMALL INTESTINE. *(E.)* Mukhopadhyay, A. K.; Weisbrodt, N. W.; Copeland, E. M.; Johnson, L. R. (Univ. Texas Med. Sch., Houston). *Tex. Rep. Med. Biol.* 32(2):585-586, 1974.

9185 CLEARANCE OF ANTIBIOTICS FROM THE INTESTINES AFTER TERMINATION OF ANTIBIOTIC DECONTAMINATION. *(E.)* van der Waaij, D.; Lekkerkerk-van der Wees, J. E. C.; Heidt, P. J. (Radiobiol. Inst., Rijswijk, Netherlands). *J. Hyg. (Camb.)* 73(3):409-414, 1974.

9186 EFFECT OF A LACTOBACILLUS PRODUCT ADMINISTRATION ON THE ANAEROBIC INTESTINAL FLORA OF AGED ADULTS. *(E.)* Yamagishi, T.; Serikawa, T.; Morita, R.; Takahashi, K.; Nishida, S. (Sch. Med., Kanazawa Univ., Japan). *Jap. J. Microbiol.* 18(3): 211-216, 1974.

9187 EFFECT OF SILVER FROM CLOUD SEEDING ON CECAL FLORA OF RABBITS. *(E.)* Jones, A. M.; Bailey, J. A. (Dept. Fishery Wildlife Biol., Colorado State Univ., Fort Collins). *Water, Air, Soil Pollut.* 3(3):353-363, 1974.

9188 NATURAL ANTIBODIES AND THE INTESTINAL FLORA OF RODENTS. *(E.)* Foo, M. C.; Lee, A.; Cooper, G. N. (Sch. Microbiol., Univ. New South Wales, Kensington, Australia). *Aust. J. Exp. Biol. Med. Sci.* 54(2):321-330, 1974.

9189 THE BIOSYNTHESIS OF A FUCOSE-CONTAINING GLYCOPROTEIN FROM INTESTINAL MUCOSA OF NORMAL AND VITAMIN A-DEFICIENT RATS. *(E.)* Kleinman, H. K.; Wolf, G. (Massachusetts Inst. Technol., Dept. Nutr., Cambridge). *Biochim. Biophys. Acta* 354(1): 17-28, 1974.

9190 EFFECTS OF ENZYME INDUCTION ON INTESTINAL PHENACETIN METABOLISM IN THE RAT. *(E.)* Pantuck, E. J.; Hsiao, K. C.; Kaplan, S. A.; Kuntzman, R.; Conney, A. H. (Coll. Physicians Surg., Columbia Univ., New York, N.Y.). *J. Pharmacol. Exp. Ther.* 191(1):45-52, 1974.

9191 DIAMINE OXIDASE IN THE SMALL INTESTINE OF RABBITS: SEPARATION FROM A SOLUBLE MONOAMINOXIDASE AND ALTERATION OF THE ACTIVITY BY INTESTINAL ISCHEMIA. *(E.)* Kusche, J.; Richter, H.; Friedrich, A.; Schmidt, J.; Hesterberg, R.; Lorenz, W. (Surg. Clin. Univ., Marburg/Lahn, Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 282(Suppl.):R53, 1974.

9192 TEMPERATURE-DEPENDENT INTERCONVERSION OF HISTAMINE H_1 and H_2 RECEPTORS IN GUINEA PIG ILEUM. *(E.)* Kenakin, T. P.; Krueger, C. A.; Cook, D. A. (Dept. Pharmacol., Univ. Alberta, Edmonton, Canada). *Nature (Lond.)* 252(5478):54-55, 1974.

9193 EXTRACTION FROM HOG DUODENUM OF A HIGH MOLECULAR WEIGHT PROTEIN WITH GASTRIC ANTISECRETORY ACTIVITY. *(E.)* Carrea, G.; Manera, E.; Mazzola, G.; Pasta, P.; Lugaro, G. (Lab. Hormone Chem., C.N.R., Milan, Italy). *Experientia* 30(10): 1213-1214, 1974.

9194 THE AETIOLOGY OF CECAL ENLARGEMENT IN THE RAT. *(E.)* Leegwater, D. C.; De Groot, A. P.; van Kalmthout-Kuyper, M. (Central Inst. Nutr. Food Res., Zeist, Netherlands). *Food Cosmet. Toxicol.* 12(5/6):687-697, 1974.

See also, 8948, 8960, 9028, 9042, 9110, 9128, 9207.

GENERAL

9195 DOES HEPATIC BLOOD FLOW DECREASE AFTER PORTAL-SYSTEMIC SHUNT? A STUDY IN THE RAT. *(E.)* Chauvaud, S.; Grange, D.; Franco, D.; Bismuth, H. (Paul Brousse Hosp., Villejuif, France). *Eur. Surg. Res.* 5(6):458-464, 1974.

Hepatic blood flow was measured by the constant BSP infusion method in 5 sham-operated Wistar rats and in 5 rats 24 hr after portacaval shunts. There were no significant differences in hepatic blood flow between the 2 groups. In sham-operated rats, hepatic blood flow was 4.6. ± 0.89 ml/min/100 g body weight and 1.37 ± 0.34 ml/min/g liver. In rats with portacaval shunts, flow was 4.04 ± 0.33 ml/min/100 g body weight and 1.32 ± 0.22 ml/min/g liver. Maintenance of a normal hepatic blood flow in shunted rats implies that hepatic arterial flow was sufficiently increased to compensate for portal blood diversion. The present results are opposed to those in the dog. Extrapolation to man of data indicating changed blood flow in shunted dogs should be reconsidered.

9196 INTERACTION OF SYSTEMIC AND LOCAL VASCULAR REGULATION OF THE INTESTINAL CIRCULATION DURING SYSTEMIC INFUSION OF NOREPINEPHRINE. *(E.)* Richardson, D. R. (Univ. Kentucky Coll. Med., Lexington). *Cardiovasc. Res.* 8(4):496-505, 1974.

Intestinal vascular dynamics during norepinephrine administration (4 μg/kg i.v.) in the cat were investigated under conditions that allowed integration of local and systemic vascular regulations. In 1 series of experiments, which involved only a portion of the small intestine, systemic regulation was excluded by placing a pressure clamp around the right carotid artery. Systemic regulation was studied by removing the pressure clamp and repeating the infusion. Results of these experiments indicated that about 60% of norepinephrine escape in the intestine during i.v. infusion was due to local regulatory adjustments and about 40% to direct and/or indirect systemic factors related to elevated blood pressure. To test the hypothesis that direct systemic adjustment was a neurogenic one operating *via* baroreceptor feed back, the norepinephrine escape response was examined before and after acute sympathetic denervation at the level of the superior mesenteric artery. This series of experiments, which involved the entire small intestine, showed that only 20% of the escape response was the result of a neurogenic mechanism. Local pressure-dependent adjustments, therefore, account for the remaining 20% of the escape not due to local autoregulatory mechanisms.

9197 METABOLISM OF ALBUMIN AND BODY FLUID COMPARTMENTS IN PROTEIN DEFICIENCY--AN EXPERIMENTAL STUDY IN THE RHESUS MONKEY. *(E.)* Deo, M. G.; Bhan, A. K.; Ramalingaswami, V. (All-India Inst. Med. Sci., New Delhi). *J. Nutr.* 104(7):858-864, 1974.

The influence of protein deficiency on the catabolism of serum albumin and body fluid compartments was investigated in 9 Rhesus monkeys tube-fed a protein-deficient diet for 9 weeks. Four control monkeys were tube-fed an isocaloric protein-rich diet for an equal length of time. In protein-deficient animals, the mean basal exchangeable albumin pool declined from 3.063 g/kg to 1.389 g/kg. The reduction was more marked in the extravascular than in the intravascular albumin pool. Protein deficiency resulted in prolongation of half-life and decreased turnover of albumin. Plasma proteins were markedly decreased in protein-deficient rats, due chiefly to a fall in plasma albumin (2.55 to 1.40 g/100 ml). Despite the reduction of serum albumin, plasma volume and extracellular fluid were not significantly altered. These findings suggest that factors other than hypoalbuminemia may be responsible for the edema of protein-calorie malnutrition.

9198 SIMILARITY OF CHRONIC COPPER TOXICITY IN RATS TO COPPER DEPOSITION OF WILSON'S DISEASE. *(E.)* Owen, Jr., C. A. (no affil.). *Mayo Clin. Proc.* 49(6):368-375, 1974.

Copper-loading was induced in male Sprague-Dawley rats by adding a 0.12% solution of cupric acid to their drinking water for periods up to 902 days. Copper concentrations in organs and excreta of these rats were compared with those reported in Wilson's disease in humans. In both conditions, very high copper concentrations occur in the liver, kidney, and urine. Little or no increase in copper was found in either condition in erythrocytes, adrenals, lungs, pancreas, bone, nails, muscle, heart, and serum. Unlike patients with Wilson's disease, copper levels were increased in rat large and small intestines, hair, bile, and feces. Specific activities of ^{67}Cu in various rat organs were studied after i.v. administration of the isotope in ionic form or incorporated into ceruloplasmin. Normal organs which accepted more ^{67}Cu from ionic copper tended to accumulate a significant amount of copper during copper loading. If the normal organ took up ceruloplasmin-^{67}Cu preferentially, little stable copper was accumulated. Organs of copper-laden rats took up less ionic ^{67}Cu than normal. In certain organs, specific ^{67}Cu activities were high initially and then decreased steadily, suggesting a relatively rapid copper turnover in such organs. This pattern occurred after injection of ionic ^{67}Cu in kidney and skin and after injection of ceruloplasmin-^{67}Cu in bone, brain, heart, and lung. Progressively increasing specific activities with ionic ^{67}Cu (brain and liver) or ceruloplasmin-^{67}Cu (skin and liver) may give a clue to the preferred forms of the metal in these organs.

9199 THE KINETICS OF RECOVERY IN IRRADIATED COLONIC MUCOSA OF THE MOUSE. *(E.)* Withers, H. R.; Mason, K. A. (M.D. Anderson Hosp. Tumor Inst., Houston, Tex.). *Cancer* 34(3)suppl.:896-903, 1974.

The acute response and kinetics of recovery of colonic mucosa to single and multiple sublethal doses of γ-rays were studied in inbred specific pathogen-free C_3Hf/Bu mice. The number of surviving cells was estimated in histological cross sections of colon at various times following irradiation by counting the number of proliferating cell colonies. The total minimal dosage was 1300 rads in single or divided doses up to 20 fractions. The colonic mucosa showed a great propensity for recovery from radiation injury. Recovery primarily was a result of sublethal injury when small numbers of large dose fractions were given. For more protracted fractionation schedules (up to 9 days), however, the sparing effect was due more to regeneration of surviving cells than to repair of sublethal injury. The rate of regeneration changed with increasingly protracted fractionation, thus resulting in nonlinear iso-effect curves, even when plotted on log coordinates. Since regeneration is so effective in sparing the colonic mucosa, the tolerance, as with other tissues, is determined by the nonproliferative components.

9200 BRIEF REPORT: RENAL AND INTESTINAL BLOOD FLOWS IN GRADED HOMORRHAGE. *(E.)* Mengoli, L. R.; Wax, S. D.; Webb, W. R. (Upstate Med. Ctr., Syracuse, N.Y.). *Circ. Shock* 1(3):239-240, 1974.

Renal and intestinal blood flows were measured in 10 mongrel anesthetized dogs subjected to graded hemorrhage. Splenectomy was performed on each animal, and square wave electromagnetic flowmeter probes were placed on the renal and superior mesenteric arteries. Systemic arterial and venous pressures as well as portal venous pressure were also monitored by appropriately placed catheters. Baseline readings were obtained for 20-45 min, and then hemorrhages of 5 cc/kg were done every 10 min until 40 cc/kg of blood had been withdrawn. Measurements of pressures and flows were made before and 5 min after each hemorrhage. Intestinal flow fell before renal flow and was depressed to 82% of baseline after the 1st hemorrhage (5cc/kg). Renal flow did not fall to a similar degree until after the 4th hemorrhage (20 cc/kg). Throughout early hypotension, intestinal flow was considerably less than renal flow; when intestinal flow had been reduced to 50% of baseline by hemorrhage totaling 15 cc/kg, renal flow was still 85% of baseline. After hemorrhage totaling 25 cc/kg, the blood pressure fell below 100 mm mercury, and the differences between renal and intestinal flow were no longer statistically significant. The possibility exists that in clinical situations where renal flow is compromised, intestinal flow may be even more severely affected and may have clinically important consequences. The lack of a precise clinical method of monitoring intestinal blood flow and function hampers further evaluation of this possibility.

9201 GASTROINTESTINAL AND MESENTERIC HEMODYNAMIC PATTERNS IN NEUROGENIC HYPERTENSIVE RABBITS. *(E.)* Alexander, N.; DeQuattro, V. (Univ. Southern California Sch. Med., Los Angeles). *Circ. Res.* 35(4): 646-651, 1974.

Blood flow patterns and vascular resistance in splanchnic tissue of rabbits with neurogenic hypertension induced by sinoaortic denervation were compared with those of normotensive sham-operated rabbits. Total splanchnic resistance was significantly higher in neurogenic hypertensive rabbits than in sham-operated animals. The magnitude of the increase varied from 34 and 35% in the cecum-appendix and ascending colon, resp., to 64 and 77% in the jejunum and stomach, resp. Blood flows were reduced 20-26% in stomach, transverse colon, decending colon, jejunum, and spleen of neurogenic hypertensive rabbits; the pancreas and the mesenteric adipose tissue had flow reductions of 27 and 42%, resp. Both groups of rabbits had an aboral flow gradient between the small and large intestines, but differences between adjacent regions were not statistically significant due to individual variation in intestinal flow patterns. Maximum duodenal flow was higher than jejunal flow in about 38% of sham-operated animals, whereas the incidence increased to 78% in hypertensive rabbits. Mean ileal flow was significantly lower than duodenal flow in hypertensive but not in sham-operated rabbits. The highly variable degree of vasoconstrictor tone within the splanchnic bed of chronic hypertensive animals reflected the net result of vascular smooth muscle response to neurogenic and local regulatory factors.

9202 ELEVATION OF TOTAL SERUM IgE IN RATS FOLLOWING HELMINTH PARASITE INFECTION. *(E.)* Jarrett, E.; Bazin, H. (Vet. Hosp., Univ. Glasgow, Scotland). *Nature (Lond.)* 251(5476):613-614, 1974.

9203 IMMUNITY TO Escherichia coli IN PIGS: ADHESION OF ENTEROPATHOGENIC Escherichia coli TO ISOLATED INTESTINAL EPITHELIAL CELLS. *(E.)* Wilson, M. R.; Hohmann, A. W. (Ontario Vet. Coll., Univ. Guelph, Canada). *Infect. Immun.* 10(4):776-782, 1974.

9204 THE ROLE OF THE HYPOPHYSIS IN THE REGULATION OF SEX DIFFERENCES IN THE ACTIVITIES OF ENZYMES INVOLVED IN HEPATIC STEROID HORMONE METABOLISM. *(E.)* Lax, E. R.; Hoff, H. G.; Ghraf, R.; Schroder, E.; Schriefers, H. (Univ. Biochem. Lab., Ulm/Donau, Germany). *Hoppe Seylers Z. Physiol. Chem.* 355(10):1325-1331, 1974.

9205 THE PRIMARY STRUCTURE OF HIGH DENSITY APOLIPOPROTEIN-GLUTAMINE-I. *(E.)* Baker, H. N.; Delahunty, T.; Gotto, Jr., A. M.; Jackson, R. L. (Baylor Coll. Med., Houston, Tex.). *Proc. Natl. Acad. Sci. USA* 71(9):3631-3634, 1974.

9206 THE RELATIVE EFFECTIVENESS OF SUPER- AND ORTHOVOLTAGE X RAYS FOR INTESTINAL DAMAGE IN MAN AND MOUSE: AN APPARENT DISCREPANCY AND ITS EXPLANATION. *(E.)* Hornsey, S.; Silvester, A. (Hammersmith Hosp., London, England). *Br. J. Radiol.* 47(562):670-672, 1974.

9207 OUABAIN EFFECTS ON INTESTINAL OXYGEN UPTAKE AND HEMODYNAMICS. *(E.)* Pawlik, W.; Shephard, A. P.; Mailman, D.; Jacobson, E. D. (Univ. Texas Med. Sch., Houston). *Tex. Rep. Biol. Med.* 32(2):594, 1974.

9208 RAPID MEASUREMENT OF BLOOD AMMONIA BY GAS ELECTRODE. *(E.)* Hollis, J. B.; Schlesinger, P. H.; Castell, D. O. (U.S. Naval Hosp., Philadelphia, Pa.). *Gastroenterology* 67(4):798, 1974.

9209 PORTAL-SYSTEMIC ANASTOMOSIS IN THE RAT. *(E.)* Lee, S.; Chandler, J. G.; Broelsch, C. E.; Flamant, Y. M.; Orloff, M. J. (Sch. Med., Univ. California, San Diego). *J. Surg. Res.* 17(1): 53-73, 1974.

9210 THE EFFECT OF COLECTOMY ON BRAIN OCTOPAMINE IN RATS WITH CHRONIC PORTACAVAL SHUNT. *(E.)* Funovics, J.; James, J. H.; Keane, J.; Foster, J.; Fischer, J. E. (Massachusetts Gen. Hosp., Boston). *Gastroenterology* 10(4-5):793, 1974.

9211 PORTAL HYPOTENSION SAFELY MAINTAINED WITH VASOPRESSIN FOLLOWING HEMORRHAGE. *(E.)* Skivolocki, W. P.; Pace, III, W. G. (Ohio State Univ. Hosp., Columbus). *Eur. Surg. Res.* 6(Suppl.):3, 1974.

See also, 9643.

DIAGNOSTIC PROCEDURES

9212 THE USE OF MULTIPLE RADIONUCLEOTIDE IMAGING TO DIFFERENTIATE THE FOCAL INTRAHEPATIC LESION. *(E.)* Muroff, L. R.; Johnson, P. M. (Coll. Physicians Surg., Columbia Univ., New York, N.Y.). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(4):728-734, 1974.

A group of 35 patients with hepatic mass lesions was studied using 2 or more radiopharmaceuticals. Of the 35 patients, 18 had hepatic metastases, 9 hepatoma, 4 abscess or cyst, 3 hemangioma, and 1 hamartoma. In each case large focal intrahepatic defects were detected on the conventional colloid liver scan using 3 mC Tc^{99m}-sulfur colloid. Each patient underwent blood pool scanning with 3-5 mC In^{113m}Cl at pH 1.7 and 6 patients also received 300 μC Se^{75}-selenomethionine. Diagnostic accuracy was improved by separating the blood pool scans into 3 categories: 1, avascular or relatively hypovascular; 2, vascularity approaching or equal to that of the normal liver; and 3, more vascular than normal liver. Each category suggests at most one further study to provide specific diagnostic information. Se^{75}-selenomethionine was used to scan 6 patients with category 2 lesions. Uptake approaching or equal to that of normal liver was revealed in 4 hepatoma patients, while 2 patients with metastases had little or no uptake of the tracer. There was excellent correlation between the results of the blood pool scans and the actual vascularity as seen on angiography and tissue section. Thus, utilization of 3 radiopharmaceuticals enables greater specificity in preoperative diagnoses.

9213 LACK OF SPECIFICITY OF THE ACID PERFUSION TEST IN DUODENAL ULCER PATIENTS. *(E.)* de Moraes-Filho, Jr., J. P. P.; Bettarello, A. (Univ. Sao Paulo Sch. Med., Brazil). *Am. J. Dig. Dis.* 19(9):785-790, 1974.

The acid perfusion test was performed on 36 male patients (aged 19-59 yr) with duodenal ulcer; 22 of these patients also had a diagnosis of reflux esophagitis, while the remaining 14 had no esophageal disease. Radiologic, endoscopic, and histologic studies were performed to evaluate the state of the esophageal and gastric mucosa. Of the 22 patients with esophagitis, 15 had heartburn, 12 chronic superficial gastritis, and 13 a positive acid perfusion test. Of the 14 patients without esophagitis, 4 had heartburn, 3 chronic superficial gastritis, and 2 a positive acid perfusion test. The correlations between the presence of esophagitis and gastritis, between gastritis plus esophagitis and heartburn, and between esophagitis plus gastritis and a positive acid perfusion test were not statistically significant. The correlations between the presence of esophagitis and heartburn, between gastritis and heartburn, and between esophagitis and a positive acid test were not significant. The validity of a positive acid perfusion test as a definite diagnosis and of heartburn as a symptom characteristic of reflux esophagitis is questioned. Both are more apt to occur when both the esophageal and gastric mucosa undergo inflammatory reaction.

9214 CLINICAL EVALUATION OF PREOPERATIVE LIVER SCINTIGRAPHY IN GASTRIC CARCINOMA PATIENTS. *(E.)* Watanabe, K.; Kawahira, K.; Matsuura, K. (Kyushu Univ. Sch. Med., Fukuoka, Japan). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 121(4):720-727, 1974.

Preoperative liver scintigrams and surgical findings were compared in 137 cases of progressive gastric carcinoma and 13 cases of early gastric carcinoma. Confirmation of the presence or absence of metastases was by autopsy in 7 cases, laparotomy in 128, and clinical diagnosis in 15. Of 44 confirmed cases of liver metastases, 37 had space-occupying lesions scintigraphically. Of 106 cases without metastases, 88 had normal scintigrams. The diagnostic accuracy of liver scintigraphy in detecting liver metastases was 90.7% (136/150). No metastases were seen in the 13 patients with early gastric carcinoma. Metastases were confirmed in 28 of 50 palpable livers and scintigraphically detected in 25 of the 28. In the remaining 100 nonpalpable livers, metastases were confirmed in 16 and scintigraphically detected in 12 of the 16. Four of the 150 cases had small scintigraphically undetectable metastatic foci (< 1 cm diameter). The close correlation with surgical findings indicates that preoperative liver scintigraphy has great diagnostic value.

9215 INTESTINAL AMEBIASIS. A ROENTGEN ANALYSIS OF 19 CASES INCLUDING 2 CASE REPORTS. *(E.)* Balikian, J. P.; Uthman, S. M.; Khouri, N. F. (American Univ. Med. Ctr., Beirut, Lebanon). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 122(2):245-256, 1974.

Two case reports are presented to illustrate the value of metronidazole (500 mg 3 times/day for 1 week) in roentgen diagnosis of intestinal amebiasis. Both cases presented with an initial roentgen appearance indistinguishable from other ulcerative disease of the colon. In a 45-yr-old man; the initial roentgenograms showed spasm in the midtransverse colon, concentric and eccentric narrowings of the lumen; thumbprinting at the ends of the lesion and exaggeration of haustral markings in the intervening area; and lack of distensibility as demonstrated under air pressure. Follow-up barium enema examination after metronidazole therapy showed complete disappearance of all roentgenologic signs of disease except for minimal edema of the haustra. In a 70-yr-old man, initial barium enema study showed a long segment of the rectum concentrically narrowed with ragged superficial and deep ulcers. A penetrating ulcer was noted leading to a pericolic abscess. Posttherapy, the penetrating ulcer and the pericolic abscess were reduced in size and the remaining ulcers had disappeared. The roentgen features of these and 17 other cases of amebiasis were compared with granulomatous colitis, ulcerative colitis, and other ulcerative diseases of the colon. Amebic colitis was characterized by a multiplicity of lesions with shaggy contours and deep and superficial ulcers with a ragged appearance. Left-sided colitis was as common as right-sided colitis, and diffuse colitis was present only in the form of multiple skip lesions. Various types of nonspecific haustral and mucosal changes were noted. The annular lesion of amebomas were distinguished from carcinomas by their gradually tapering ends, fairly well-preserved mucosa, and response to antiamebic therapy.

9216 RADIOLOGIC OBSERVATIONS ON INTESTINAL AMEBASIS. *(E.)* Kolawole, T. M.; Lewis, E. A. (Univ. Coll. Hosp., Ibadan, Nigeria). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 122(2):257-265, 1974.

Radiologic examination of 8 patients with amebic colitis showed that the disease involved the cecum in all cases, the entire colon in 5, and the rectum in 4. Ulcers were observed in 5 patients and usually involved a long segment of the colon and/or rectum. The ulcers had a saw-toothed appearance initially, later becoming confluent and forming collar-stud abscesses underneath the mucosa. No definite evidence of intraperitoneal perforation was seen. Two patients presented with toxic dilation involving the transverse colon and hepatic flexure. The affected portions of the colon also showed pseudopolyposis, thumbprinting of the mucosa, and exaggeration of the haustra. One patient initially showed a lack of haustra in the descending colon (pipestem colon); 18 months later the lesion involved the entire colon and cecum, suggesting a progression of the lesion from the left half of the colon to the right. In this case the ileocecal valve was incompetent and the cecum contracted. Two cases showed multiple strictures and skip lesions involving, resp., the left half and the right half of the colon. Multiple strictures due to amebomata formation were present in 4 cases; 1 ameboma was an annular mass mimicking a carcinoma and another presented as an intussusception. In 1 patient with multiple strictures, pseudodiverticula in the midtransverse colon were more prominent after metronidazole treatment (800 mg 3 times/day for 2 weeks). Ulcers occurred in 3 patients with ameboma, 1 patient with toxic dilatation, and 1 with multiple strictures. Incompetence of the ileocecal valve was seen in all cases of total colonic involvement due to extension of the disease to the cecum and its ileocecal valve. The close similarities of radiologic changes in amebic colitis and nonspecific chronic ulcerative colitis demonstrate that a clear distinction between the 2 conditions also requires consideration of other epidemiologic, clinical, and laboratory findings.

9217 A RAPID METHOD FOR MEASUREMENT OF FRACTIONAL INTESTINAL ABSORPTION OF CALCIUM. *(E.)* Chanard, J.; Assailly, J.; Bader, C.; Funck-Bretano, J. L. (Necker Hosp., Paris, France). *J. Nucl. Med.* 15(7):588-592, 1974.

Calcium absorption was measured in 49 patients and 11 controls in less than 8 hr using only ^{47}Ca, 1st injected i.v. (5 μC) and then p.o. (10 μC) 2 hr later. Assuming that plasma disappearance of the i.v. dose was identical to that of the absorbed oral dose, it was verified that: 1) the absorption of the radioactive oral dose was achieved within 4 hr; and 2) the log curve of plasma radioactivity obtained after total absorption of the oral dose is a straight line parallel to that obtained after the i.v. dose. This corresponds to the exchangeable calcium expanding pool model. Measured fractional intestinal Ca absorption was 58.9% in controls; 90.7% in primary hyperparathyroidism; 79.3% in idiopathic hypercalciuria; 81% in Paget's disease; and 35.8% in chronic renal failure treated conservatively. Following hemodialysis, fractional intestinal Ca absorption was transiently increased to 50.6% when performed 10-12 hr after the hemodialysis run. There was no significant correlation between the fractional intestinal Ca absorption variation and variations of creatinine, bicarbonates, and protein in the plasma induced by the hemodialysis run.

9218 DOUBLE CONTRAST BARIUM ENEMA EXAMINATION UTILIZING A FLUOROSCOPIC TABLE WHICH MAKES LATERAL DECUBITUS POSITIONING POSSIBLE. *(E.)* Niizuma, S.; Kobayashi, S. (Niigata Cancer Hosp., Japan). *Acta Med. Biol.* 22(1):9-21, 1974.

9219 PROTEOLYTIC ACTIVITY IN DUODENAL JUICE IN INFANTS, CHILDREN, AND ADULTS. *(E.)* Lindberg, T. (Malmo Gen. Hosp., Sweden). *Acta Paediatr. Scand.* 63(6):805-808, 1974.

9220 A HYDRAULIC MULTIPLE INTESTINAL BIOPSY APPARATUS FOR INFANTS. *(E.)* Meeuwisse, G. W.; Lindberg, T.; Blomberg, M. (Malmo Gen. Hosp., Sweden). *Acta Paediatr. Scand.* 63(6):839-842, 1974.

9221 A ONE-DAY SELECTIVE MIGRATION PROCEDURE FOR DETECTING SALMONELLAE IN FAECES. *(E.)* Chau, P. Y.; Huang, C. T. (Dept. Microbiol., Univ. Hong Kong). *J. Clin. Pathol.* 27(5):405-407, 1974.

9222 SIGNIFICANCE OF THE INDIRECT HAEMAGGLUTINATION TEST FOR THE DIAGNOSIS OF AMOEBIASIS. *(E.)* Vinayak, V. K.; Prakash, O.; Talwar, G. P.; Tandon, B. N.; Mohapatra, L. N. (All-India Inst. Med. Sci., New Delhi). *Indian. J. Med. Res.* 62(8):1171-1175, 1974.

9223 HEPATIC FUNCTIONAL INVESTIGATIONS. QUESTIONS RAISED BY L'ANALYSE DES DONNEES. *(E.)* Hita de Nercy, Y.; Feuillu, A.; Kerbaol, M.; Mahe, M.; Lenoir, P.; Gastard, J.; Bourel, M. (Pontchaillou Hosp., Rennes, France). *Digestion* 10(4-5): 356, 1974.

9224 LABELED ASIALO-HUMAN CHORIONIC GONADOTROPIN AS A LIVER-SCANNING AGENT. *(E.)* Birken, S.; Canfield, R. E. (Coll. Phys. Surg., Columbia Univ., New York, N.Y.). *J. Nucl. Med.* 15(12):1176-1178, 1974.

9225 UNUSUAL ARTIFACT IN LATERAL LIVER SCANS. *(E.)* McCauley, D.; Braunstein, P. (New York Univ. Med. Ctr., N.Y.). *J. Nucl. Med.* 15(12): 1201-1203, 1974.

9226 PERCUTANEOUS NEEDLE BIOPSY OF THE LIVER AND LARGE BILE DUCT OBSTRUCTION. *(E.)* Scheuer, P. J.; Morris, J. S.; Gallo, G. A.; Sherlock, S. (Roy. Free Hosp., London, England). *Gastroenterology* 67(4):827, 1974.

9227 CONTRIBUTION OF THE RADIORENOGRAM IN THE EARLY DIAGNOSIS OF THE HEPATORENAL SYNDROME. *(E.)* Kehayoglou, K.; Kotsakis, P.; Alevizou-Terzaki, V. (Univ. Athens Med. Sch., Greece). *Digestion* 10(4/5):358, 1974.

9228 DIAGNOSTIC USE OF ^{13}N-AMMONIA IN NORMALS AND IN PATIENTS WITH CIRRHOSIS OF THE LIVER. *(E.)* Hazenberg, H. J. A.; Gips, C. H.; Beekhuis, H.; Schuurman, J. J.; Vaalburg, W. (Univ. Hosp., Groningen, Netherlands). *Digestion* 10(4-5):354, 1974.

9229 THE SIGNIFICANCE OF ^{198}Au SCANNING OF THE LIVER IN DIAGNOSIS OF CIRRHOSIS. *(Rus.)* Bazikalo, P. V.; Shmakov, Iu. G. (Chernigov Region. Hosp., USSR). *Vrach. Delo* (8):87-89, 1974.

9230 HEPATIC CAVERNOUS HEMANGIOMA PRESENTING AS AN "AVASCULAR MASS" IN A NEWBORN. *(E.)* Beal, W.; Soin, J. S.; Burdine, J. A. (Baylor Coll. Med., Houston, Tex.). *J. Nucl. Med.* 15(10):902-903, 1974.

9231 THE USE OF ACID HEMOLYSIS OF ERYTHROCYTES TO TEST THE SEVERITY OF INFECTIOUS HEPATITIS. *(Rus.)* Piasetskii, B. N. (Odessa Med. Inst., USSR). *Vrach. Delo* (8):142-144, 1974.

9232 LACTATE DEHYDROGENASE ACTIVITY IN PATHOLOGICAL HISTOENZYMOLOGY. *(Fr.)* Leger, H.; Deminiere, C.; Tran-Nguyen-Si (no affil.) *Bordeaux Med.* 6(13):1909-1916, 1973.

See also, 9087, 9243, 9355, 9365, 9373, 9394, 9395, 9449, 9579, 9635.

GASTROINTESTINAL DISEASES

ESOPHAGUS

9233 INTRAEPITHELIAL CARCINOMA OF THE ESOPHAGUS: CASE REPORT AND CONSIDERATION TO THE SUPERFICIAL CARCINOMA OF THE ESOPHAGUS. *(E.)* Iizuka, T.; Hirata, K.; Mitomi, T.; Miwa, T.; Hirota, T.; Sano, R. (Natl. Cancer Ctr. Hosp., Tokyo, Japan). *Jap. J. Clin. Oncol.* 12(3):105-112, 1973.

An intraepithelial carcinoma of the esophagus was diagnosed in a 79-yr-old man presenting with hematemesis. X-ray examination revealed no abnormalities, but fiber esophagoscopy showed a shallow lesion in the mucous membrane. In addition, gastrocamera revealed sessile polyps on the posterior wall of the antrum. Biopsy findings were squamous cell carcinoma of the esophagus and atypical intestinal metaplasia. The patient underwent gastrotomy for removal of the sessile polyps and esophageal resection. Microscopic examination of the esophageal biopsy specimen confirmed the diagnosis of intraepithelial squamous cell carcinoma and showed no invasion below the basement membrane. The polypoid stomach tumor was an adenocarcinoma papillotubulare, but the stalk was intact. A resected esophageal carcinoma from a 51-yr-old man was also predominantly intraepithelial, but at 1 point the carcinomatous invasion extended through the lamina muscularis mucosa. In this case a papilloma was detected in the vocal cord. No lymph node metastasis from the esophageal carcinoma was seen in either case.

9234 BRONCHOGRAPHIC AND ANGIOPNEUMOGRAPHIC CHANGES ASSOCIATED WITH ESOPHAGEAL HIATUS HERNIA. AN EXPERIMENTAL STUDY IN DOGS. *(E.)* Senyk, J.; Arborelius, Jr., M.; Lilja, B.; Nylander, G. (Dept. Thoracic Surg., Univ. Lund, Sweden). *Eur. Surg. Res.* 6(2):72-78, 1974.

The effects of experimentally created esophageal hiatus hernia on bronchi and pulmonary vessels were studied in 5 mongrel dogs. Before distension neither the arterial nor the venous phase was affected by the created hiatus hernia. During distension of the gastric pouch, both the caliber of the arterial branches supplying the compressed parenchyma and the volume of the lower lobe decreased. Arteries close to the compressed parenchyma were dilated and stased. Occlusion of the posterior-basal, latero-basal or anterior-basal segments was found in 4 of the animals. A cranial dislocation and distortion of the segmental bronchi of the posterior- or latero-basal segments were noted in 2. No bronchial or vascular changes were registered in the upper part of the left lung. Some of the angiographic slow passage of contrast may have been secondary to hypoventilation and local hypoxia with active vasoconstriction. These results suggest that it is unlikely that the apical functional changes registered in 20% of the patients with hiatus hernia could be secondary to effects of the thoracic loculus *per se*. This confirms clinical findings that hiatus hernia may cause basal atelectasis and changes in the regional lung function localized to the basal parts of the lung.

9235 SURGICAL TREATMENT OF GASTROESOPHAGEAL REFLUX IN INFANTS. *(E.)* Randolph, J. G.; Lilly, J. R.; Anderson, K. D. (Dept. Surg., George Washington Univ., Washington, D.C.). *Ann. Surg.* 180(4):479-486, 1974.

A total of 31 infants under age 1 yr underwent surgery for correction of pernicious gastroesophageal reflux. The most important indications for surgery were severe growth retardation from persistent vomiting (25 patients) and recurrent aspiration pneumonia (6). Barium swallow confirmed the diagnosis of gastroesophageal reflux in all children and demonstrated a concomitant hiatus hernia in 17. Patients selected for surgery were 1st treated conservatively unless they showed significant esophagitis or had a major portion of stomach in the chest. Infants treated early in the series had Allison repairs (7 transabdominal, 2 thoracic); 20 subsequent infants had Nissen fundoplication and 2 had Boerema gastropexy. In 15 patients, significant gastric outlet obstruction required a complementary pyloroplasty. Four infants required a second surgical procedure because of recurrence; 2 of the 4 had Nissen procedures with good results, 1 following a Boerema gastropexy and 1 following an Allison repair. The other 2 patients needed revision after fundoplication. There were no operative deaths. Of 28 patients followed for 6 months to 8 1/2 yr, all have excellent nutritional status and are following normal growth curves. Study of these patients indicates the need for early diagnosis and medical or surgical therapy for all infants with major gastroesophageal reflux.

9236 UPPER OESOPHAGEAL SPHINCTER YIELD PRESSURE IN NORMAL SUBJECTS AND IN PATIENTS WITH GASTRO-OESOPHAGEAL REFLUX. *(E.)* Stanciu, C.; Bennett, J. R. (Hull Roy. Infirm., England). *Thorax* 29(4):459-462, 1974.

Upper esophageal sphincter yield pressure was measured in 26 normal subjects and in 69 patients (39 men and 30 women, aged 17-70 yr) with heartburn and acid regurgitation related to posture and meals. Of these 69, 21 had hiatus hernia and/or gastroesophageal reflux. A system of continuously perfused catheters was used for obtaining the measurements. There was no significant difference between the two groups. Perfusion of the esophagus with hydrochloric acid produced no change in sphincter pressure. The resting sphincter pressure was not related to the degree of esophagitis nor to the severity of reflux as measured by 15-hr pH recordings. These results indicate that gastroesophageal reflux is unlikely to play a major role in the etiology of pharnygeal diverticuli through the mechanism of changes in cricopharyngeal sphincter pressure. There were significant differences in sphincter pressure recorded by the 3 catheters either when their orifices were set 5 cm apart longitudinally or when they were at the same level, equidistant around the circumference of a circle. This indicates that spatial orientation of catheter tips influences the pressure recorded from a sphincter.

9237 MORTALITY FROM NEONATAL DIAPHRAGMATIC HERNIA. *(E.)* Dibbins, A. W.; Wiener, E. S. (Children's Hosp., Pittsburgh, Pa.). *J. Pediatr. Surg.* 9(5):653-662, 1974.

Arterial blood gas and acid-base patterns were studied in 20 newborns with left posterolateral diaphragmatic hernias diagnosed and operated on before age 24 hr. Three groups of infants were distinguished: (1) those with little, if any, pulmonary hypoplasia; (2) those with true bilateral pulmonary hypoplasia; and (3) those with hypoplasia of 1 lung. Group 1 corresponded to 6 survivors with normal or near normal $PaCO_2$ values, rapid expansion of the ipsilateral lung after hernia repair, and little or no postoperative right-to-left shunting. Group 2 comprised 2 nonsurvivors who failed to attain a normal $PaCO_2$ and who developed severe hypoxemia and unrelenting acidosis. Group 3, consisting of 2 survivors and 10 nonsurvivors, was characterized by initial hypercapnia and acidosis, a slowly expanding or nonexpanding ipsilateral lung, and right-to-left shunt in the postoperative period. In the latter group, both preductal and ductal shunting were seen. The clinical pattern was severe distress at birth, improvement after operation, and subsequent deterioration. In each case, onset of deterioration was identified as severe hypoxemia with shunting, usually at a preductal level, triggered by sudden pulmonary hypertension. Survival of infants with diaphragmatic hernia depends on a delicate balance between pulmonary arterial and ductal tone. Therefore, treatment should be in the direction of pharmacologic manipulation of pulmonary arterial pressure and the rate of ductal closure.

9238 SELECTIVE ARTERIOGRAPHY OF THE LEFT GASTRIC ARTERY IN THE DIFFERENTIAL DIAGNOSIS OF BENIGN STENOSIS OF THE THORACIC ESOPHAGUS. *(Cz.)* Rapant, V.; Rehulka, M.; Prasil, J. (Med. Fac., Purkinje Univ., Olomouc, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 28(2):136-140, 1974.

Two case reports are presented to illustrate the difficulty of differentiating between short areas of stenosis in the middle of the thoracic esophagus which complicate Barrett's esophagus and brachyesophagus secondary to reflux esophagitis. A 63-yr-old man with an 11-yr history of progressive dysphagia and no appreciable subjective symptoms was diagnosed as having brachyesophagus secondary to reflux esophagitis caused by a sliding hiatus hernia. At surgery, a short area of annular stenosis was found in an otherwise normal esophagus along with an almost undetectable axial hiatus hernia. A 51-yr-old man who had undergone gastrectomy for duodenal ulcer was suspected of having either stenosis in Barrett's esophagus or a recurrent duodenal ulcer. At surgery, the latter diagnosis was confirmed. A 57-yr-old woman complained of gallbladder symptoms, occasional vomiting, slight loss of weight, and, during the past 3 months, difficulty in swallowing which became so severe that she could only swallow liquids. Esophageal x-rays showed a small axial hiatus hernia with a short area of tubular stenosis in the middle of the thoracic esophagus with the irregular contours of a slightly dilated esophagus above the stenosis. The radiologist suspected secondary brachyesophagus and reflux esophagitis with stenosis resulting from a sliding hiatus hernia. Since these radiological findings were similar to those in another patient with granulomatous esophagitis, an unsuccessful attempt was made to perform selective arteriography of the left gastric artery to rule out secondary brachyesophagus. It was impossible to distinguish between the celiac artery and the left gastric artery and its branches from the many branches of the splenic and hepatic arteries. At surgery, secondary brachyesophagus was found along with a small axial hernia. Unfortunately, no biopsies were taken before or after surgery.

9239 SUPERSENSITIVITY TO PENTAGASTRIN IN DIFFUSE OESOPHAGEAL SPASM. *(E.)* Eckardt, V.; Weigand, H. (Dept. Med. (I), Univ. Mainz, Germany). *Gut* 15(9):706-709, 1974.

A 38-yr-old man with a 9 month history of dysphagia and substernal pain was evaluated manometrically and radiographically. Initial manometric recordings showed a lower esophageal sphincter pressure of 30 mm Hg and normal relaxation with swallowing, thus excluding the diagnosis of achalasia. Each swallow was followed by spontaneous, repetitive contractions lasting up to 30 sec. Following s.c. injection of pentagastrin (6 μg/kg), the esophagus responded in the hypersensitive fashion observed in achalasia when cholinergic agents are given. Multiple powerful, spontaneous contractions, not initiated by a swallow, appeared and mean esophageal resting pressure rose from a basal level of -2 to +8 mm Hg; lower esophageal sphincter pressure increased to 60 mm Hg. The pentagastrin effect lasted for up to 30 min during which time the patient experienced a retrosternal burning sensation. A similar hypertensive response was observed with i.v. pentagastrin (0.04-1.0 μg/kg). The pentagastrin effect was completely abolished by nitroglycerine (0.8 mg sublingual) and was inhibited by atropine (0.5 mg i.v.). Barium study following s.c. pentagastrin showed irregular localized contractions, alternating with areas of dilatation, in the lower esophagus. The so-called corkscrew appearance of the esophagus was characteristic for diffuse esophageal spasm. The inhibition of the pentagastrin effect by atropine suggests that the effect was mediated through acetylcholine release.

9240 COMBINED MYOTOMY AND HIATAL HERNIORRHAPHY. A NEW APPROACH TO ACAHALASIA. *(E.)* Peyton, M. D.; Greenfield, L. J.; Elkins, R. C. (Univ. Oklahoma Health Sci. Ctr., Oklahoma City). *Am. J. Surg.* 128(6):786-790, 1974.

To better assess the disease entity of achalasia and to evaluate postoperative results, patients with dysphagia and barium swallows indicative of achalasia were evaluated by esophageal function studies. Radiographic evaluation of 14 patients with dysphagia and achalasia revealed 13 with esophageal dilatation-motility disturbance, 9 with distal esophageal spasm, and 3 with esophageal reflux. There was no radiographic evidence of achalasia. Positive manometric findings in all 14 patients were discoordinated peristalsis with marked tertiary contractions plus failure of the lower esophageal sphincter (LES) to relax with barium swallowing. LES pressure averaged 17.5 mm Hg (range of 8-30 mm Hg); average length was 2.5 cm. The standard acid reflux test (SART) revealed esophageal reflux in 7 patients, an incidence of 50% compared with the 21% incidence by radiography. Eight patients were treated with Heller esophagomyotomy and Belsey Mark IV hiatus herniorrhaphy. Postoperative studies showed reversal of LES spasm and obstruction, and abatement of radiographic reflux. Although the SART revealed persistence of reflux in 2 patients, clinical resolution of symptoms and weight gain reflected successful management.

9241 EVALUATION OF CURRENT OPERATIONS FOR THE PREVENTION OF GASTROESOPHAGEAL REFLUX.

(E.) DeMeester, T. R.; Johnson, L. F.; Kent, A. H. (Tripler Army Med. Ctr., Honolulu, Hawaii). *Ann. Surg.* 180(4):511-525, 1974.

A prospective, randomized study was done on 45 patients to evaluate the effectiveness of the Hill, Nissen, and Belsey antireflux procedures. All patients had symptoms of gastroesophageal reflux unresponsive to medical therapy, a positive standard acid reflux test, esophagitis (38/45), or a positive Bernstein test (7/45). Esophageal symptomatic, radiographic, manometric, and pH (standard acid reflux test and 24-hr monitoring) evaluation was done pre- and postsurgery (average of 154 days). All procedures improved the symptoms of pyrosis, but improvement was best after the Nissen repair. Only the Nissen procedure gave complete protection against gastroesophageal reflux, as shown by the standard acid reflux test and 24-hr esophageal pH monitoring, a sensitive measurement of frequency and duration of reflux. Recurrence of hiatus hernia in 1 patient with a Hill repair and in 3 with a Belsey repair was associated with recurrence of reflux on pH testing. The Nissen and Belsey repairs increased distal esophageal sphincter pressure significantly more than the Hill repair. Sphincter length and dynamics remained unchanged. The Nissen procedure placed significantly more of the manometric sphincter below the respiratory inversion point in the positive pressure environment of the stomach. Esophageal length was increased by the Nissen and Hill repairs, which may account for the high incidence of temporary dysphagia following these repairs. Despite the dysphagia and inability of 50% of 15 patients with Nissen repairs to vomit, the procedure is the method of choice for surgical therapy of gastroesophageal reflux. It produces a competent cardioesophageal sphincter by increasing its resting pressure and improving its response to an increase in intragastric pressure. Morbidity was low after the Nissen repair (complications occurred in 2 patients but in only 1 case were related to the repair technique). For patients without complications, the average hospital stay after the Nissen repair was 11 days. Follow-up studies 283-696 days after surgery showed no recurrence of reflux in 3 patients with Nissen repairs. In contrast, 1 of 3 with a Hill repair and 2 of 3 with a Belsey repair had a late recurrence of reflux.

9242 A CONTROLLED TRIAL OF METOCLOPRAMIDE IN REFLUX OESOPHAGITIS.

(E.) Paull, A.; Grant, A. K. (Queen Elizabeth Hosp., Adelaide, Australia). *Med. J. Aust.* 2(17):627-629, 1974.

A double-blind controlled trial was instituted to assess the symptomatic benefit of oral metoclopramide in patients with gastroesophageal reflux. A group of 31 patients entered the 6-week trial. Of these 31, 16 (9 men, 7 women, aged 30-76 yr) were given placebo tablets, and the remaining 15 (7 men, 8 women, aged 26-72 yr) received metoclopramide tablets (10 mg). One tablet was administered 1/2 hr before meals three times/day and one on retiring. Of the 15 who received metoclopramide, 10 experienced significant and sustained improvement. Of the 16 receiving placebo, 7 also derived sustained improvement. There was therefore no significant statistical difference between the 2 groups, although the trend favored metoclopramide. Side effects were infrequent. Of the patients receiving metoclopramide, 2 noted drowsiness and dizziness, but similar symptoms were documented in 2 receiving placebo. One person on metoclopramide experienced recurrent masseter spasm and tongue dystonia for the first 4 days, but on continuation of the tablets, these symptoms disappeared. The improvement of 7 patients while using placebo tablets suggests that personal attention to the individual sufferer with esophageal reflux may be an important factor in affording relief of symptoms.

9243 FUNCTIONAL DISORDERS OF THE OESOPHAGUS.

(E.) Punto, L. (Dept. Diagnostic Radiol., Univ. Oulu, Finland). *Ann. Clin. Res.* 6(Suppl. 14): 1-72, 1974.

9244 ESOPHAGEAL ACHALASIA: DIAGNOSIS AND CARDIOMYOTOMY IN A NEWBORN INFANT.

(E.) Asch, M. J.; Liebman, W.; Lachman, R. S.; Moore, T. C. (Dept. Surg. Pediatr., Univ. California, Los Angeles). *J. Pediatr. Surg.* 9(6):911-912, 1974.

9245 CARDIOVASCULAR MALFORMATIONS AND OESOPHAGEAL ATRESIA.

(E.) David, T. J.; O'Callaghan, S. E. (Bristol Gen. Hosp., England). *Br. Heart J.* 36(6):559-565, 1974.

9246 SYNCOPE ASSOCIATED WITH ESOPHAGEAL STRICTURE.

(E.) Trujillo, N. P.; Spero, C. (George Washington Univ. Med. Sch., Washington, D.C.). *Med. Ann. DC* 43(11):553-556, 1974.

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9247 ESOPHAGEAL INVOLVEMENT IN EPIDERMOLYSIS BULLOSA. *(E.)* Berkmen, Y. M. (New York Med. Coll. Metrop. Hosp. Ctr., New York). *Am. J. Gastroenterol.* 62(2):145-147, 1974.

9248 ESOPHAGEAL PERFORATION DURING ESOPHAGOSCOPY IN CHILDREN. *(E.)* Simpson, J. S.; Ruff, T.; Fearon, B. (Hosp. Sick Children, Toronto, Canada). *Ann. Otol.* 83(6):725-728, 1974.

See also, 9213, 9536, 9555, 9628, 9638, 9644.

STOMACH

9249 THE ANATOMICAL LOCALIZATION OF CARCINOMA OF THE STOMACH. A COMPARISON OF RADIOLOGICAL SERIES IN JAMAICAN AND AUSTRALIAN PATIENTS. *(E.)* Bateson, E. M. (Darwin Hosp., Australia). *Med. J. Aust.* 1(17):647-650, 1974.

A comparison was carried out of the anatomical location of cancer of the stomach as demonstrated by barium meal x-ray examinations of 185 patients in Western Australia (35% female, average age 69.0 yr) and 177 patients in Jamaica (34% female, average age 61.5 yr). Of those cancers which could be localized in the Jamaica series, 82% were in the antrum, 12% in the body and 6% in the fundus. Corresponding figures for the Western Australia series were 44%, 40%, and 16%, resp. Due to the small number of carcinomas in the fundus, the stomach was re-divided for the purposes of this study into 2 parts, proximal (fundus and body) and distal (antrum). No significance of location in relation to sex was noted. The Jamaica series showed a preponderance of distal growth at all ages, whereas the Western Australia series had a preponderance of proximal growths at all ages. Both series showed an increasing incidence of distal carcinoma with increasing age. The high incidence of cancer of the antrum of the stomach in Jamaica and in other developing countries of the world suggests a common factor which may be related to dietary deficiencies common in such countries, namely caloric, protein, vitamin A, calcium and riboflavin deficiencies.

9250 FEULGEN—CYTOPHOTOMETRIC STUDIES OF GASTRIC MUCOSAL SMEARS IN MALIGNANT AND BENIGN DISEASES OF THE STOMACH. *(E.)* Wiendl, H. J.; Schwabe, M.; Becker, G.; Kowatsch, J. (Surg. Clin., Univ. Munich, Germany). *Acta Cytol. (Baltimore)* 18(3):222-230, 1974.

Cytophotometric DNA determinations were made of endoscopically removed brush smears from benign and malignant stomach diseases (32 carcinomas, 1 reticulosarcoma, 31 benign ulcers, 22 pronounced inflammatory conditions, and 8 polyps). DNA peak formation in normal stomach mucosa was in the diploid region. All malignant tumors showed a definite increase in mean DNA content, broad scattering of determined values, and a shift of the DNA peak to the aneuploid region. However, smears from ulcers, inflammatory conditions (including 12 cases of intestinal metaplasia), and polyps also showed elevated DNA and aneuploidy. From 26-58% of all cells lay in the intertriploid-tetraploid region. The data indicate that stomach diseases that might become cancerous cannot be differentiated on the basis of DNA determinations. As a prescreening method, automated assessment of DNA distribution in stomach smear preparations is highly problematic.

9251 SPECIES DIFFERENCES IN SUSCEPTIBILITY TO THE GASTRO-ULCEROGENIC ACTION OF ANTI-INFLAMMATORY AGENTS. *(E.)* Wilhelmi, G. (Pharmaceut. Div., Ciba-Geigy Ltd., Basel, Switzerland). *Pharmacology* 11(4):220-230, 1974.

Phenylbutazone in 2 doses of 100 mg/kg produced gastric ulceration in various strains of rats treated p.o. and in quail, axolotl, and crucian carp treated i.m. or i.p. Results in mice were negative following p.o. administration. Treatment of rats, guinea pigs, and mice with several different doses of phenylbutazone, oxyphenbutazone, indomethacin, and flufenamic acid showed that the rat stomach was the most sensitive to the ulcerogenic effects of the 4 anti-inflammatory agents (all administered p.o.). Dosages were 2 X 1 to 2 X 100 mg/kg for indomethacin and 2 X 25 to 2 X 400 mg/kg for the other agents. In mice and guinea pigs, ulceration occurred only in response to the higher doses. Like phenylbutazone, flufenamic acid was mildly ulcerogenic in guinea pigs and mice but markedly so in rats. Oxyphenbutazone had a very slight ulcerogenic effect in mice and guinea pigs and a more pronounced effect in rats. Indomethacin had a mild effect in guinea pigs but was highly ulcerogenic in rats and mice. The margin between the ulcerogenic and lethal doses of phenylbutazone, oxyphenbutazone, and flufenamic acid was wide in the rats and narrow in the guinea pig and the mouse. With indomethacin, the margin was wide in the mouse and narrow in the other species. The anti-inflammatory activity of the 4 preparations against acute paw edema differed in the same species. In the guinea pig, all 4 preparations showed a favorable therapeutic ratio, i.e., relation between anti-inflammatory and ulcerogenic activity; in the mouse and the rat, no consistent relation was demonstrable. In most cases, however, anti-inflammatory activity at a given dose level did not parallel gastro-ulcerogenic activity.

9252 CARCINOEMBRYONIC ANTIGEN AND BLOOD GROUP SUBSTANCES IN CARCINOMAS OF THE STOMACH AND COLON. *(E.)* Denk, H.; Tappeiner, G.; Davidovits, A.; Eckerstorfer, R.; Holzner, J. H. (Univ. Vienna Sch. Med., Austria). *J. Natl. Cancer Inst.* 53(4):933-942, 1974.

Carcinoembryonic antigen (CEA) of the digestive system and blood group substances (BG) were studied in gastric and colon carcinomas by indirect immunofluorescence and mixed-cell agglutination reaction, resp. In contrast to CEA, no positive correlation between BG and the differentiation of the tumor was found. In adenocarcinomas of the colon and stomach, CEA and BG, if present simultaneously, showed different localizations. CEA was detected on the lumen-oriented surface of the tumor cells, whereas BG were distributed over the whole cell. Anaplastic carcinomas were either CEA negative or contained only minute amounts of CEA, but expressed BG in roughly the same percentage as well-differentiated carcinomas. Signet-ring cells consistently positive for CEA localized in the cytoplasm were mostly BG negative. The BG activity in gastric and colon cancers was ethanol sensitive. Only in some predominantly well-differentiated adenocarcinomas did BG resist to some degree the ethanol treatment. Anti-BG serum did not react with CEA in this system, which indicates either that the morphologic methods were too insensitive to detect cross-reactivity or that sites on CEA responsible for the cross-reactions with BG-A antiserum observed *in vitro* were uncovered during isolation and purification. In some frozen sections of gastric and colon carcinomas, the BG activity detected was not compatible with the BG of the patient.

9253 STUDIES OF INTESTINAL METAPLASIA IN THE GASTRIC MUCOSA BY DETECTION OF DISACCHARIDASES WITH "TES-TAPE." *(E.)* Kawachi, T.; Kogure, K.; Tanaka, N.; Tokunaga, A.; Sugimura, T.; Koyama, Y.; Kanasurgi, K.; Hirota, T.; Sano, R. (Natl. Cancer Ctr. Res. Inst., Tokyo, Japan). *J. Natl. Cancer Inst.* 53(1):19-30, 1974.

The range and intensity of intestinal metaplasia in the gastric mucosa were estimated by visualizing the activities of disaccharidases with Tes-Tape. Specimens were obtained by gastrectomy of 111 patients with gastric carcinoma, 2 with gastric sarcoma, 13 with gastric ulcer, and 8 with duodenal ulcer. In both stomach cancer and ulcer, the incidence and intensity of sucrase and maltase activities were high in the antrum and lowest along the greater curvature, especially on the oral side. The area giving a positive reaction for maltase was wider than that for sucrase, and the color reaction for maltase was stronger than that for sucrase in the area where both reactions were positive. Trehalase activity was detected in some cases. The trehalase reaction was closely associated with the area where the alkaline phosphatase reaction was positive and where Paneth's cells were observed histologically. The area giving a sucrase reaction coincided well with the area where appearance of intestinalization was proved histologically by the presence of goblet cells, but was not related to presence of Paneth's cells.

9254 MALABSORPTION SECONDARY TO ANTRAL GASTRIN-CELL HYPERPLASIA. *(E.)* DiMagno, E. P.; Go, V. L. W. (Mayo Clin., Rochester, Minn.). *Mayo Clin. Proc.* 49(10):727-738, 1974.

A 48 yr old man with hypergastrinemia and antral cell hyperplasia in the absence of a pancreatic tumor is described. He originally presented with malabsorption and subsequently developed a peptic ulcer in the 3rd portion of the duodenum, had hypergastrinemia which increased 4-fold after a test meal, and had elevated levels of antral tissue gastrin. Total gastrectomy was performed. In the intervening 2 yr period, the patient has had normal fasting serum gastrin levels and no diarrhea or loss of weight. The serum gastrin response to feeding, the increased gastrin content of the antrum, the absence of a gastrinoma, and the short clinical course (7 months from onset of disease to total gastrectomy) characterize antral cell hyperplasia and differentiate it from the classic Zollinger-Ellison syndrome with gastrinoma. However, as in Zollinger-Ellison syndrome with gastrinoma, malabsorption in this patient with antral cell hyperplasia was due to gastric hypersecretion inactivating pancreatic lipase and causing excessive dilution of small intestinal contents. The thyroid-binding globulin deficiency in this patient was probably an incidental finding and is not known to have been reported as occurring with Zollinger-Ellison syndrome or with any other endocrine disease.

9255 MALLORY-WEISS SYNDROME. A REAPPRAISAL. *(E.)* Watts, H. D.; Admirand, W. H. (San Francisco Gen. Hosp., Calif.). *JAMA* 230(12):1674-1675, 1974.

A review of 840 patients treated for upper gastrointestinal hemorrhage at a large metropolitan hospital over a 7-yr period revealed the Mallory-Weiss lesion as the bleeding site in 36 (4.5%). The 36 patients included 31 men and 5 women, aged 29-71 yr. Diagnosis was established by endoscopy (29 patients) or surgery (2), or both (5). Mucosal tears were located in the distal esophagus, proximal stomach, and astride the cardioesophageal junction with equal frequency. All patients had significant melena or hematemesis or both on admission. Hiatus hernia was present in 53% of the patients, gastritis in 54%, and esophagitis in 17%. Only 7 patients required surgery and only 22 required transfusion (average 1200 ml of blood). The only death in the series occurred because of postoperative complications unrelated to the basic lesion. The data suggest that the Mallory-Weiss syndrome has a wider and more benign clinical spectrum than has been reported previously.

9256 THE ROLE OF CHOLESTYRAMINE IN THE PREVENTION OF STRESS ULCERS. *(E.)* Zike, W. L.; Safaie-Shirazi, S.; Denbesten, L. (Univ. Iowa

Coll. Med., Iowa City). *J. Surg. Res.* 17(5):315-319, 1974.

The role of cholestyramine in the prevention of bile salt-induced stress ulceration during hemorrhagic shock, and reduction of ionic movement across the gastric mucosal barrier was investigated in mongrel dogs. The dogs were bled to a mean arterial blood pressure of 40-45 mm Hg and maintained at this pressure for 4 1/2 hr. The duodenum had been occluded with a noncrushing clamp proximal to the common bile duct to prevent any regurgitiation of bile or duodenal chyme into the stomach. During hemorrhagic shock 8 dogs were injected intragastrically with 100 cm^3 of a solution containing HCl (100 mEq/liter), taurocholic acid (15 mM/liter), and polyethylene glycol (2 mg/ml). Another 8 dogs received 100 ml of a solution containing the same additives followed by cholestyramine (4 g). None of the cholestyramine-treated dogs had gastric mucosal lesions at autopsy, whereas all dogs which received HCl and bile acid had severe mucosal alterations typical of stress ulcers. The lesions were most prominent in the fundus but were also present in the antrum. Cholestyramine significantly reduced back diffusion of H^+ across the gastric mucosal barrier (-0.73 ± 0.30 mEq/liter/30 min *versus* -3.58 ± 0.30 mEq/liter/30 min). Cl^- efflux and Na^+ and K^+ influx were also decreased by cholestyramine. On the basis of its ability to prevent a break in the canine gastric mucosal barrier and to reduce H^+ ion loss, a clinical trial of cholestyramine in humans is warranted.

9257 ENHANCING EFFECT OF CLAMPING OF THE PORTAL VEIN ON THE EFFECTIVENESS OF ANTITUMOR AGENTS AGAINST ABDOMINAL TUMOR GROWTH. *(E.)* Kaibara, N.; Wakasugi, K.; Kumashiro, R.; Inokuchi, K. (Fac. Med., Kyushu Univ., Fukuoka, Japan). *Gann* 65(2):119-122, 1974.

The effect of clamping of the portal vein on the tissue levels of various chemotherapeutic agents in various abdominal organs was studied in female Donryu rats bearing a transplantable anaplastic pulmonary carcinoma. Anesthetized animals received an i.v. injection *via* the tail vein of either mitomycin-C (20 mg/kg), bleomycin (45 mg/kg) or 5-fluorouracil after which the portal vein was clamped for 10 min. Under these conditions, the levels of all 3 drugs in stomach and small intestine were twice those in controls. Liver, abdominal muscle and serum levels were unaffected. Direct examination of tumor size 12 days after treatment showed that tumor growth was markedly suppressed in animals which had received mitomycin-C followed by portal vein clamping; the effects of the other 2 drugs were not studied in this manner. The number of foci of lymphatic metastases and of peritoneal dissemination were especially decreased following clamping. Thus, simultaneous i.v. injection of antitumor agents with clamping of the portal vein may induce higher tissue levels and enhance the suppressive effect on tumor growth.

9258 GASTRIC XANTHELASMA: ENDOSCOPIC RECOGNITION. *(E.)* Javdan, P.; Pitman, E. R.; Schwartz, I. S. (City Hosp. Ctr., Elmhurst, N.Y.). *Gastroenterology* 67(5):1006-1010, 1974.

A 36 yr old male presented with intermittent upper abdominal pain which had lasted for about 4 yr. Pain was located in the epigastrium without radiation and had no relation to meals. Nausea was frequent, but no vomiting. Stool examination disclosed ova of *Ascaris lumbricoides*, *Trichuris trichuria*, and hookworm. Piperazine and thiabenazole were given after which stools were negative for parasites, and eosinophils in the peripheral blood decreased from 8% to 1%. Still the patient suffered epigastric pain. A gastrointestinal series suggested prepyloric gastric ulcers. Six weeks after an ulcer regimen, the gastrointestinal series was normal but the patient still suffered epigastric discomfort. An esophagogastroduodenoscopy was performed. The esophagus was normal. A yellow sessile nodule approximately 5 mm in diameter was noted in the prepyloric area. Two other flat or slightly elevated yellowish-pink lesions were noted 2 to 3 cm distal to the first. The hematoxylin and eosin-stained section revealed pyloric gastric mucosa. The lamina propria between the glands was occupied by large ovoid to polygonal histiocytes having an abundant, finely vacuolated, cytoplasm staining light with eosin. No identifiable periodic acid Schiff-stainable material was noted, thus indicating the absence of a mucopolysaccharide component. The foam cell nuclei were regular, round to ovoid, and occupied a small portion of the cell area. No mitoses were observed. By oil red O technique, the cytoplasmic vacuoles were shown to represent a stainable lipid appearing as bright orange-red droplets. It is suggested that while the significance of the lesion is questionable a more careful search endoscopically and pathologically of gastrectomy specimens and stomachs at autopsy will reveal gastric xanthelasma in higher percentages of patients than has been recognized thus far.

9259 A PROFILE OF THE 'PERFECT' ANTACID. *(E.)* Kerr, G. D. (Copthorne Hosp., Shrewsbury, England). *J. Int. Med. Res.* 2(2):1-5, 1974.

9260 THE IN VITRO EVALUATION OF ANDURSIL. *(E.)* Rigby, G. I. J.; Bisknell, R. J.; Smith, L. M. (Geigy Pharmaceuticals, Macclesfield, England) *J. Int. Med. Res.* 2(2):29-38, 1974.

9261 THE HEIDELBERG CAPSULE AND ITS USE IN A CLINICAL TRIAL OF ANDURSIL. *(E.)* Ewe, K. (Univ. Med. Clin., Mainz, Germany). *J. Int. Med. Res.* 2(2):47-53, 1974.

9262 MODERN DIAGNOSTIC TECHNIQUES IN GASTROINTESTINAL FUNCTION AS A BASIS FOR THERAPY WITH NEW ANTACIDS. *(E.)* Heinkel, K. (Med. Clin., Stuttgart, Germany). *J. Int. Med. Res.* 2(2):39-45, 1974.

9263 CALCIUM AND PHOSPHORUS CONTENT IN GASTRIC JUICE. *(Rus.)* Kravets, M. G. (Kemerovo Med. Inst., USSR). *Sov. Med.* (6)76-79, 1973.

9264 A PROPOSED ROLE FOR PGE_2 IN THE GENESIS OF STRESS-INDUCED GASTRIC ULCERS. *(E.)* Daturi, S.; Franceschini, J.; Madelli, V.; Mizzotti, B.; Usardi, M. M. (Carlo Erba Inst. Ther. Res., Milan, Italy). *Br. J. Pharmacol.* 52(3):464P, 1974.

9265 SELECTIVE INHIBITION OF DOPAMINE-β-HYDROXYLASE IN THE PERIPHERAL TISSUES BY 5-DIMETHYLDITHIOCARBAMYLPICOLINIC ACID; ITS EFFECT ON STRESS-INDUCED ULCER, ETHANOL-INDUCED SLEEP AND BLOOD PRESSURE. *(E.)* Hidaka, H.; Hara, F.; Harada, N.; Hashizume, Y.; Yano, M. (Inst. Dev. Res., Ksaugai, Japan). *J. Pharmacol. Exp. Ther.* 191(3):384-392, 1974.

9266 LATE RESULTS OF SUBTOTAL GASTRECTOMY, OF VAGOTOMY WITH ANTRECTOMY AND OF VAGOTOMY WITH PYLOROPLASTY. *(Fr.)* Henrion, C. (Amory Clin., Boussu, Belgium). *Acta Chir. Belg.* 73(3):319-332, 1974.

9267 MANAGEMENT OF CORROSIVE GASTRITIS DUE TO INGESTED ACID. *(E.)* Chong, G. C.; Beahrs, O. H.; Payne, W. S. (Mayo Grad. Sch. Med., Univ. Minnesota, Rochester). *Mayo Clin. Proc.* 49(11): 861-865, 1974.

9268 EROSIVE GASTRITIS WITH SPECIAL REFERENCE TO THE ROLE OF ASPIRIN AND BILE. *(E.)* Reynolds, K. W. (Charing Cross Hosp., London, England). *Ann. R. Coll. Surg. Engl.* 55(5):213-225, 1974.

9269 GASTRITIS CAUSED BY MULTIPLE Nematospiroides dubius INFECTIONS. *(E.)* Liu, S. K.; Cypess, R. H.; Van Zandt, P. (Animal Med. Ctr., New York, N.Y.). *J. Parasitol.* 60(5):790-793, 1974.

9270 IgE-CONTAINING CELLS IN NORMAL AND PATHOLOGIC GASTRIC MUCOSA: IMMUNOFLUORESCENT STUDY OF 35 GASTRIC BIOPSIES. *(E.)* Camilleri , J. P.; Berault, J.; Diebold, J. (Hotel-Dieu, Paris, France). *Digestion* 10(3):213-214, 1974.

9271 GASTROSCOPY AND HISTOLOGY ON DIRECTED BIOPSIES IN HEALTHY MEDICAL STUDENTS. *(E.)* Myren, J.; Serck-Hanssen, A. (Ulleval Univ. Hosp., Oslo, Norway) *Scand. J. Gastroenterol.* 9(27):48, 1974.

9272 POSSIBILITIES OF UTILIZATION OF BLASTIC TRANSFORMATION OF LYMPHOCYTES IN THE DIAGNOSIS OF DISEASES ASSOCIATED WITH RADIOLOGICALLY CONFIRMED GASTRIC AND DUODENAL CHANGES. *(Pol.)* Pluzanska, A.; Mazurowa, A.; Olszanska, T. (Inst. Intern. Med., Lodz, Poland). *Pol. Arch. Med. Wewn.* 50(6):565-568, 1973.

9273 FINE STRUCTURE OF EXPERIMENTAL GASTRIC TUMOR IN RAT. *(E.)* Nishi, K.; Tamura, K. (Toneyama Hosp., Japan). *J. Electron Microsc. (Japan)* 23(3):214, 1974.

9274 ULTRASTRUCTURE OF SEROSAL SURFACE IN GASTRIC CARCINOMA. *(E.)* Kondo, K.; Nagatomo, T. (Ctr. Adult Dis., Osaka, Japan). *J. Electron Microsc. (Japan)* 23(3):147-159, 1974.

9275 EARLY GASTRIC CARCINOMA. *(Fr.)* Rubay, J.; Fievez, C.; Majois, J.; Janssen, A. (St. Joseph Hosp., Gilly, Belgium). *Acta Gastroenterol. Belg.* 36(9):456-471, 1973.

9276 EARLY DIAGNOSIS OF GASTRIC CARCINOMA. *(Pol.)* Pazderski, H. (Munic. Hosp., Ostrow Swietokrzyski, Poland). *Wiad. Lek.* 26(21):1999-2002, 1973.

9277 FIBROLEIOMYOMA OF THE STOMACH. *(It.)* Molino, D.; Montella, L.; De Rosa, A. (A. Cardarelli Reg. Gen. Hosp., Naples, Italy). *Chir. Gastroenterol.* 7(4):420-427, 1973.

9278 THE GASTRIC POLYP—A CONTROVERSIAL ISSUE. *(E.)* Werbitt, W.; Myerson, R. M. (Med. Coll. Pennsylvania, Philadelphia). *Pa. Med.* 77(8): 45-47, 1974.

9279 GASTROCUTANEOUS FISTULA AFTER TUBE GASTROSTOMY. INCIDENCE IN INFANTS AND CHILDREN. *(E.)* Aronian, J. M.; Redo, S. F. (New York Hosp.-Cornell Univ. Med. Ctr., N.Y.). *NY State J. Med.* 74(13):2364-2366, 1974.

9280 EXULCERATIO SIMPLEX DIEULAFOY. *(E.)* Aahrimaa, M.; Aho, A. J. (Dept. Surg., Univ. Turku, Finland). *Scand. J. Gastroenterol.* 9(27):16, 1974.

See also, 9032, 9214, 9366, 9408, 9633, 9635, 9638, 9644.

STOMACH

Peptic Ulcers

9281 LEARNED CONTROL OF GASTRIC ACID SECRETIONS IN ULCER PATIENTS. *(E.)* Welgan, P. R. (Milwaukee County Hosp., Wisc.). *Psychosom. Med.* 36(5):411-419, 1974.

If individuals could learn visceral and glandular responses and were thus able to control the blood flow and motility in the stomach, factors contributing to conditions such as peptic ulcer might be controlled. An attempt was made to train 10 peptic ulcer patients (8 men and 2 women, aged 35-60 yr) to increase the pH of gastric acid secretions. In the 1st experiment, in the presence of pH feedback, the 10 subjects showed significant increases in pH of gastric acid secretions, while acid concentration and volume of secretions significantly declined. When feedback was subsequently withheld, no significant changes appeared in these measures. A 2nd study was then initiated to test whether initial changes following the basal period were experimental effects. The 10 subjects were divided into 2 groups, 1 receiving no feedback after basal condition, the 2nd group receiving feedback after basal condition. Results showed that significant increases in pH and decreases in acid concentration and volume occurred only after the onset of pH feedback. This preliminary work suggests that gastric acid secretion may be altered and controlled with the appropriate feedback.

9282 INVESTIGATIONS ON THE RELATIONSHIP BETWEEN MAXIMAL ACID OUTPUT AND PARIETAL CELLS IN GASTRIC MUCOSAL BIOPSIES WITH SPECIAL REFERENCE TO DUODENAL ULCER. *(E.)* Schmidt-Wilcke, H. A.; Haake, U.; Riecken, E. O. (Med. Univ. Clin., Marburg/Lahn, Germany). *Acta Hepatogastroenterol.* 21(4):297-302, 1974.

Male patients (aged 36-76 yr) with duodenal ulcer, chronic atrophic gastritis, and controls without gastrointestinal disease were examined with respect to the relation of their maximal acid output and parietal cell density in gastric mucosal biopsies. Maximal acid output was measured using the pentagastrin (1.5 μg/kg/hr) infusion test. Parietal cells were marked histochemically in fresh frozen sections by means of their SDH-activity. Controls and duodenal ulcer patients showed a biphasic course with a peak during the 3rd collection period after the start of infusion, and a slight decrease of 10% (maximum) during the following periods. In contrast, a delayed increase of acid secretion was noted in patients with superficial and chronic atrophic gastritis. This could indicate functional impairment of the parietal cells in conditions of gastritis. In comparing mucosal appearance with parietal cells marked by the SDH-reactivity, a marked difference between the parietal cell density of the duodenal ulcer patients and controls was not easily seen. This is in contrast to the patients with superficial and chronic atrophic gastritis. There seems to be an overall reduction of the parietal cells in superficial gastritis, while in atrophic gastritis the diminution is much more pronounced and irregular in distribution. In chronic atrophic gastritis patients, a significant decrease in total mucosal thickness and glandular mucosal thickness was found. The mucosa of duodenal ulcer patients, however, showed a marked increase of these parameters; correspondingly, the mucosa of these patients showed a considerable increase in parietal cell density. In patients with superficial and, in particular, chronic atrophic gastritis, the parietal cells were significantly diminished. Findings also indicate that there is not only hypertrophy of the mucosa, but also hyperplasia of the parietal cells. There was a linear relation of parietal cell density to the maximal acid output.

9283 AETIOLOGY OF DUODENAL ULCER: AN INVESTIGATION INTO THE BUFFERING ACTION AND EFFECT ON PEPSIN OF BRAN AND UNREFINED CARBOHYDRATE FOODS. *(E.)* Tovey, F. I. (Basingstoke Dist. Hosp., Mysore City, India). *Postgrad. Med. J.* 50(589):683-688, 1974.

Staple carbohydrate foods from various populated areas of the world were investigated for their buffering action and for their effect on pepsin activity. Their effect on gastric secretion was compared with the effect of milk and of antacids. Results indicate that rice bran and some unrefined grains (ragi, maize, whole-meal wheat) buffer more acid than the refined food-stuffs (polished rice, cassave or white flour). The buffering effect is most marked over a pH range of 1.5-3. Digestion by pepsin increased the buffering effect of food substances, more so in those which are less refined. Using 37.5 mEq as the average 1 hr maximal acid output in a duodenal ulcer patient, the following quantities of food would be needed to buffer it to pH 7.4: polished rice, 1250 g; unpolished rice, 357 g; ragi, 417 g. Gastric acid secretion was measured in 17 duodenal ulcer patients in response to food substances. Using the convention of free and total acid, the total acid concentration was higher in the presence of bran, milk and alkalies, but ragi and cholam gave similar levels to polished rice. Free acid levels were similar in pattern, except for milk powder which had a more powerful and prolonged buffering effect with lower levels of free acid. Measurement of the effect of food substances on pepsin activity did not suggest the presence of any powerful pepsin inhibitor in rice bran or wheat bran or in any of the unrefined grains tested. These results do not support the theory that the loss of buffer in the preparation or refinement of the staple carbohydrate food is the whole explanation of any protective effect of unrefined foods in peptic ulcer. Although rice bran, wheat bran, ragi, and maize do have a greater buffer content than do refined carbohydrate foods such as polished rice, white flour and cassave, the former group are also antral stimulants, resulting in an increased acid output in the stomach. Only when the buffering effect exceeds the stimulus to greater acid output will there be a fall in acid concentration.

9284 PSYCHIATRIC DISTURBANCE AND POSTVAGOTOMY DIARRHOEA. *(E.)* Johnstone, E. C.; Allan, J. G.; Geraghty, B. P.; Russell, R. I. (Southern Gen. Hosp., Glasgow, Scotland). *J. Psychosom. Res.* 18(3):205-208, 1974.

Postvagotomy diarrhea occurred in 14 of 28 patients who had undergone vagotomy and drainage operations for duodenal ulcers. To determine if the diarrhea was related to psychological factors, the Goldberg Standardized Psychiatric Interview and a self rating scale, the Middlesex Hospital Questionnaire, were administered to postvagotomy patients with and without diarrhea and to patients with nonspecific dyspepsia (12), peptic ulcer (13), and chronic blood diseases (14). Postvagotomy patients with diarrhea had significantly higher Goldberg scores than patients with peptic ulcer and chronic blood disorder. On the Middlesex Hospital Questionnaire, the postvagotomy patients with diarrhea scored significantly higher than patients with chronic blood diseases. The absence of any significant difference between postvagotomy patients with and without diarrhea indicates that the diarrhea was not secondary to psychological factors.

9285 BLOOD SUPPLY TO THE HUMAN GASTRODUODENAL MUCOSA WITH SPECIAL REFERENCE TO ULCER-BEARING AREAS. *(E.)* Piasecki, C. (Roy. Free Hosp. Sch. Med., London, England). *J. Anat.* 118(2):295-335, 1974.

The intramural arteries of the healthy human stomach and duodenum were studied postmortem by injection and cleaning of specimens from 13 adults, 4 fetuses, 1 stillbirth, and 1 neonate. While previous authors have noted only poverty of the vasculature of the lesser curvature as a whole, the present findings show a quantitative decrease in number and caliber of anastomoses from cardiac to pyloric parts. In the submucous plexus the degree of anastomosis in the cardiac area is similar to that on the mid-anterior and posterior walls and is significantly greater than in the pyloric region. The diminuation may be gradual or may occur at the halfway point. In the duodenum the plexus is poorest close to the pylorus and increased distally. The supraduodenal artery is not an end artery. However, only a small proportion of the flow in its parent trunks can pass through its anastomoses on the anterior wall, assuming that flow is proportion to the 4th power of the radius in the postmortem state. In general, mucosal arteries arose from the submucous plexus. However, a few single mucosal arteries arose extramurally, pierced all the muscle, and made little or no communication with the submucous plexus. In the stomach they occurred on both curvatures but were most common in the pyloric 1/2 of the lesser curvature including the incisura. These vessels, when present at the incisural region, might be constricted by prolonged peristaltic waves that stand still in this region, thus inducing chronic gastric ulceration. In the duodenum, such mucosal arteries were found only around the circumference of the 1st inch of the organ. A logarithmic relation was established between postmortem caliber of the mucosal arteries and the area of mucosa they supply. There was a single population of mucosal arteries. As a rule there was no anastomosis between mucosal arteries and their branches, with micromanipulation indicating that apparent anastomoses were due to overlapping of vessels. No single arterio-venous anastomosis was seen, possibly because specimens were not injected before 24 hr postmortem.

9286 MULTIPLE BENIGN GASTRIC ULCERS: A CLINICAL AND GASTROSCOPIC STUDY. *(E.)* Dagradi, A. E.; Falkner, R. E.; Lee, E. R. (Long Beach VA Hosp., Calif.). *Am. J. Gastroenterol.* 62(1):36-45, 1974.

Gastroscopic examination of 119 men (aged 22-89 yr) with benign gastric ulcer demonstrated multiple ulcers in 36 (30%) and solitary ulcer in 83 (70%). X-rays had been negative in 11 patients with multiple ulcers and in 31 with solitary lesions. The incidence of ingestion of ulcerogenic drugs, primarily salicylates, in relation to onset of symptoms was 92% for patients with multiple ulcers and 38% for those with solitary lesions. In an aged-matched group of patients, the incidence of salicylate ingestion close to time of hospitalization was 16.5%. Upper gastrointestinal bleeding occurred in 75% of patients with multiple ulcers and in 48% with solitary ulcer. However, the degree of blood loss was greater for patients with solitary lesions, 75% of whom required transfusion compared with 55% with multiple ulcers. Multiple ulcers were 0.5-3.0 cm in diameter and solitary ulcers from 0.5-4.0 cm. In all cases, the ulcers were largest when first encountered and subsequently exhibited a progressive reduction in size and/or number. The majority of multiple ulcers (66%) disappeared during the first 2 weeks compared with healing of 20% of solitary lesions in the same period. In 12 patients in whom healing of all but 1 of multiple ulcers occurred within 2 weeks, the remaining ulcer followed the same course of healing as that of solitary ulcers. Superficial and atrophic gastritis was present to the same extent in both groups. Approximately 1/2 of patients tested (15 with multiple ulcers and 39 with solitary) had significantly low basal and histalog-stimulated gastric secretions. The demonstration of plural lesions and the apparent etiologic relation to salicylate ingestion are the only characteristics which would permit consideration of multiple benign ulcers as a clinical entity.

9287 GASTRIC ACID SECRETION AND RISK OF RECURRENCE OF DUODENAL ULCER WITHIN SIX TO EIGHT YEARS AFTER TRUNCAL VAGOTOMY AND DRAINAGE. *(E.)* Kronborg, O. (Bispebjerg Hosp., Copenhagen, Denmark). *Gut* 15(9):714-719, 1974.

The value of insulin and augmented histamine tests in predicting recurrence of duodenal ulcer within 6-8 yr after truncal vagotomy and drainage was assessed in a series of 500 consecutively and electively operated patients. Criteria of recurrence were established by a discriminative analysis of gastric acid secretion parameters. Recurrence was predicted with a probability of about 75% in patients with dyspepsia, the ratio between recurrence and dyspeptic nonrecurrences being 1:1. The discriminatory ability of the insulin test was no better than that of the postoperative histamine test. Men with a preoperative peak acid output (PAO) greater than 46.1 mEq/hr after histamine had a 21% risk of recurrence; women with a PAO greater than 41.5 mEq/hr had a risk of 28%. Below these levels the risk was 5 and 1%, resp., demonstrating that recurrence after vagotomy is related to the number of parietal cells before vagotomy. Duodenal ulcer patients with a high number of parietal cells should be treated with vagotomy and antrectomy.

9288 LYSOLECITHIN: A FACTOR IN THE PATHOGENEIS OF GASTRIC ULCERATION? *(E.)* Johnson, A. G.; McDermott, S. J. (Charing Cross Hosp. Med. Sch., London, England). *Gut* 15(9):710-713, 1974.

Lysolecithin concentrations were measured in intermittent samples of night gastric juice from 10 patients with gastric ulcers, 10 with duodenal ulcers, and in 5 normal controls. In the gastric ulcer patients, the mean of the peak concentration (444 μg/ml) and mean of concentrations in all samples (100 μg/ml) were significantly higher than in controls (34 μg/ml and 18 μg/ml, resp.) Duodenal ulcer patients had mean values between the gastric ulcer and control groups: 5 patients with peak values less than 100 μg/ml resembled control patients in the mean of peak samples and mean of all samples, while 5 patients with peak values greater than 100 μg/ml had values approaching those of the gastric ulcer patients. Four patients with recurrent gastric ulcers after surgery had higher lysolecithin concentrations than those found in primary gastric ulcer. Of 2 subjects retested after 6 months, a control patient had similar results on both occasions but a patient with recurrence of gastric ulcer showed an increase in peak values (from 430-920 μg/ml) and mean values (from 290-359 μg/ml). Lysolecithin levels in gastric ulcer patients were as high as those found to damage the dog's mucosal barrier. It is concluded that reflux of lysolecithin is as important, or more important, than reflux of bile salts in breaking the mucosal barrier and therefore in the etiology of gastric ulcer.

9289 CHRONIC DISEASE IN FORMER COLLEGE STUDENTS. XIII. EARLY PRECURSORS OF PEPTIC ULCER. *(E.)* Paffenbarger, Jr., R. S.; Wing, A. L.; Hyde, R. T. (Univ. California Sch. Public Hlth., Berkeley). *Am. J. Epidemiol.* 100(4):307-315, 1974.

A total of 487 male former students (1.8% of 26,954 questionnaire respondents) reported doctor-diagnosed peptic ulcer with onset between college case-taking and questionnaire response 16-50 yr later. One-half of the ulcers were duodenal, 1/10 gastric, and the rest unspecified as to type. Peptic ulcer incidence rates were computed in relation to traits and medical events recorded at college-case taking. Factors that predisposed to an increased incidence of peptic ulcer in later life were coffee and soft drink consumption; tobacco smoking habits; lower systolic blood pressure; less participation in physical activity and varsity sports; and history of indigestion or diarrhea. Paired combinations of these characteristics in youth additively augmented the risk of subsequent peptic ulcer. Neither tea nor alcohol consumption in college influenced the incidence of peptic ulcer, but milk consumption was inversely related. None of 10 self-assessed personality traits or a similar battery of doctor-assessed psychological traits distinguished students who later developed peptic ulcer. Habitual coffee consumption in college emerged as the best predictor of subsequent peptic ulcer, while milk consumption identified those most likely to remain free of peptic ulcers. With coffee consumption, ulcer incidence rates increased from 17.7/1000 for abstainers to 31.7 for consumers of 2 or more cups/day, a 79% differential. Milk drinkers had an ulcer incidence of 16.4/1000 compared with 30.3/1000 for nondrinkers, a 46% reduction. In paired combination with high-risk characteristics, the suggestion of a protective effect from drinking milk was substantial.

9290 SECRETION OF HYDROCHLORIC ACID AND SOLUBLE GLYCOPROTEINS OF GASTRIC JUICE IN HEALTHY HUMANS. *(E.)* Badurski, J.; Zwierz, K.; Bogdanikowa, B. (Inst. Intern. Dis., Bialystok, Poland). *Acta Med. Pol.* 15(1-2):19-26, 1974.

9291 THE EFFECTS OF CARBENOXOLONE ON THE BIOSYNTHESIS OF GASTRIC GLYCOPROTEINS IN THE RAT AND FERRET. *(E.)* Shillingford, J. S.; Lindup, W. E.; Parke, D. V. (Dept. Biochem., Univ. Surrey, Guildford, England). *Biochem. Soc. Trans.* 2(5):1104-1105, 1974.

9292 BODY BUILD AND PEPTIC ULCER MORTALITY. *(E.* Polednak, A. P. (State Dept. Health, Albany N.Y.). *Human Biol.* 46(3):573-581, 1974.

9293 CLINICAL ASPECTS OF PEPTIC ULCERATION. *(E.* Fielding, J. F. (Jervis Street Hosp., Dubli Ireland). *J. Int. Med. Res.* 2(2):13-15, 1974.

9294 ANTICHOLINERGICS IN PEPTIC ULCER: HOW USEFUL? *(E.)* Aquilina, J. T. (no affil.). *Consultant* 14(8):117-119, 1974.

9295 ACID SECRETION IN DUODENAL ULCER DISEASE BEFORE AND AFTER SURGERY. *(E.)* Baron, J. H. (Roy. Postgrad. Med. Sch., London, England). *Mt. Sinai J. Med. NY* 41(6):732-753, 1974.

9296 EFFECT OF SECRETIN ON GASTRIC AND PANCREATI SECRETION IN DUODENAL ULCER PATIENTS WITH GASTRIC HYPERSECRETION. *(E.)* Konturek, S. J.; Biernat, J.; Grzelec, T. (Inst. Physiol., Krakow, Poland). *Rend. Gastroenterol.* 6(1):29-34, 1974.

9297 PERSONALITY AND GASTRIC ULCER. *(Pol.)* Bojanowicz, K.; Rybarczyk, Z. (Inst. Intern. Med., Lodz, Poland). *Wiad. Lek.* 26(22):2081-2085, 1973.

9298 DIAGNOSTIC SIGNIFICANCE OF GASTRIC ULCERS "EN PLATEAU". *(Rum.)* Jocu, I.; Ilie, E. (Dr. I. Cantacuzino Hosp., Bucharest, Rumania). *Med. Interna (Bucur.)* 25(2):237-245, 1973.

9299 CHRONIC GASTRIC ULCER ON THE POSTERIOR WALL. *(E.)* Palmer, E. D. (no affil.). *JAMA* 230(3):459-461, 1974.

9300 PROXIMAL GASTRIC VAGOTOMY WITH AND WITHOUT PYLOROPLASTY—THE PRESENT POSITION. *(E.)* Wastell, C.; Colin, J. F.; MacNaughton, J. I. (Gordon Hosp., London, England). *Eur. Surg. Res.* 6(1):1-4, 1974.

9301 THE EFFECT OF PROXIMAL GASTRIC VAGOTOMY ON THE HISTOLOGICAL STRUCTURE OF GASTRIC MUCOSA IN MAN. *(E.)* Roland, M.; Berstad, A.; Liavag, I. (Aker Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(27):20, 1974.

9302 INTRAGASTRIC PRESSURE/VOLUME RELATIONSHIP BEFORE AND AFTER PROXIMAL GASTRIC VAGOTOMY. *(E.)* Stadaas, J. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 9(27):19, 1974.

9303 THE SPECIFIC FEATURES AND CLASSIFICATION OF POSTGASTRECTOMY SYNDROMES. *(Rus.)* Artemiev, E. N.; Mikanba, Z. M. (Moscow Med. Stomatol. Inst., USSR). *Ter. Arkh.* 46(4):110-114, 1974.

9304 ENDOSCOPY IN THE SEQUELAE OF CONSERVATIVE SURGERY PERFORMED FOR PEPTIC ULCERS. *(Fr.)* Housset, P.; Crespon, B.; Debray, C. (Bichat Hosp., Paris, France). *Ann. Gastroenterol. Hepatol. (Paris)* 9(5):477-488, 1973.

9305 CATHETER DUODENOSTOMY AFTER BILLROTH II GASTRECTOMY. *(E.)* Peyton, M. D.; Hartsuck, J. M. (Univ. Oklahoma Health Sci. Ctr., Oklahoma City). *Am. J. Surg.* 128(6):782-785, 1974.

See also, 8933, 9027, 9030, 9036, 9049, 9213, 9250, 9253, 9254, 9263, 9264, 9272, 9306, 9329, 9638.

SMALL INTESTINE

9306 CLINICAL AND LABORATORY STUDY OF POSTVAGOTOMY DIARRHOEA. *(E.)* Browning, G. G.; Buchan, K. A.; Mackay, C. (Western Infirm., Glasgow, Scotland). *Gut* 15(8):644-653, 1974.

A group of 32 patients who had diarrhea following bilateral truncal vagotomy for chronic duodenal ulcer were studied. In 16 patients (13 men and 3 women, mean age 44.6 yr) this was combined with a Heineke-Mikulicz pyloroplasty and in the other 16 patients (11 men and 5 women, mean age 45.8 yr) with a retrocolic gastroenterostomy. Surgery had been performed an average of 4.1 yr previously. In 8 patients (25%) the diarrhea was a daily occurrence, whereas in the other 24 it was episodic in nature. An additional group of 24 patients who also had elective surgery for chronic duodenal ulceration but who did not experience diarrhea was studied. Each of these 24 patients had had a bilateral truncal vagotomy and in 12 this was combined with a Heineke-Mikulicz pyloroplasty and in the other 12 with a retrocolic gastroenterostomy; surgery had been performed an average of 1.5 yr earlier. The incidence of bacterial colonization of the upper small intestine was no different in the 2 groups, although patients with a gastroenterostomy had a significantly higher incidence than those with a pyloroplasty. There was a higher incidence of anaerobic colonization in patients with diarrhea, but the difference was not statistically significant. Colonization was associated with lower levels of gastric acid secretion. Although 13 patients with diarrhea had an abnormal fecal fat excretion, no correlation could be found between this and the severity of the diarrhea or bacterial colonization, either with an anaerobic or a coliform type flora. No small intestinal mucosal abnormality was noted in patients with diarrhea, their mean hematological and serum biochemistry values were normal, and the body weights of these individuals was similar to that before operation. Abnormal hematological values were noted in 2 patients with diarrhea 5 yr after vagotomy and gastroenterostomy in association with anaerobic colonization of the upper small intestine. As the incidence of hematological abnormalities after gastric surgery increases with time, colonized patients might merit particularly close clinical observation.

9307 ENTEROKINASE IN CONTAMINATED SMALL-BOWEL SYNDROME. *(E.)* Rutgeerts, L.; Mainguet, P.; Tytgat, G.; Eggermont, E. (Dept. Pediatr., Univ. Louvain, Belgium). *Digestion* 10(4/5):249-254, 1974

Enterokinase, trypsin, and amylase were measured in duodenal and jejunal contents of 6 patients with bacterial overgrowth in the proximal small intestine. The patients included 1 man and 2 women with multiple diverticula of the proximal small bowel, 1 man with eosinophilic enteritis, and 2 men with chronic intestinal pseudo-obstruction. Activities of all 3 enzymes were significantly decreased in the duodenal content; in the proximal jejunal fluid only enterokinase was significantly reduced. In both the duodenal and proximal jejunal, enterokinase activity was less than 1/3 of normal. In 2 patients with Crohn's disease, duodenal enterokinase and trypsin activities were normal. In contrast, enterokinase activity was absent in the dilated ileum proximal to the obstructing lesions of Crohn's disease. The simultaneous occurrence of unmeasurable enterokinase and measurable trypsin activities in patients with proximal bacterial overgrowth would indicate enough enterokinase remained to initiate activation of trypsinogen. However, in situations of massive proximal overgrowth with extensive mucosal damage, mucosal and luminal enterokinase could be low enough to impair protein digestion despite sufficient output of pancreatic proenzymes.

9308 LUMINAL DISTENSION AS A POSSIBLE CONSEQUENCE OF EXPERIMENTAL INTESTINAL PERFUSION. *(E.)* Wingate, D.; Hyams, A.; Phillips, S. (Mayo Clin., Rochester, Minn.). *Gut* 15(9):728-732, 1974.

In a quantitative analysis of the clinical effects of incomplete intestinal perfusate recovery, proximal jejunal segments of healthy subjects were perfused by a double-lumen technique with glucose electrolyte solutions containing 0, 2.5, 5.0, and 10.0 mM/liter concentrations of glycocholic acid, glycochenodeoxycholic acid, and glycodeoxycholic acid. The subjects received 4 consecutive 90-min perfusions, each perfusion containing 1 of the bile acid concentrations. Distress occurred only during perfusions with 5 and 10 mM/liter dihydroxy bile acids, i.e., at concentrations that arrest absorption or provoked net secretion. The clinical effects of these perfusions were associated with poor recovery of secretogenic perfusates. Analysis of volume changes demonstrated that secretogenic perfusions may generate substantial fluid volumes in the lumen of the small intestine. Such volumes can cause discomfort in healthy subjects and may possibly be hazardous in the presence of intestinal disease. When solutions are perfused into the small intestine in conditions associated with net fluid secretion, care is required to avoid excess perfusion rates and to ensure adequate perfusate recovery.

9309 THE SMALL INTESTINE IN DERMATITIS HERPETIFORMIS. *(E.)* Fry, L.; Sea, P. P.; Harper, P. G.; Hoffbrand, A. V.; McMinn, R. M. (St. Mary's Hosp., London, England). *J. Clin. Pathol.* 27(10): 817-824, 1974.

Both the numbers and the site of the lymphocytes in the epithelium were studied in small intestinal biopsies from 43 patients with dermatitis herpetiformis (21 men and 22 women, aged 23-76 yr) to determine the relation of lymphocytes to the gluten-sensitive enteropathy associated with this disease. The diagnosis of dermatitis herpetiformis was made on clinical and histological criteria and on the presence of IgA deposits in the uninvolved skin. The macroscopic appearance of the intestinal biopsy was flat in 13, convoluted in 10, leaves only in 8, and leaves in 12. Small intestinal biopsies from 20 patients (7 men and 13 women, aged 22-73 yr) without dermatitis herpetiformis or gastrointestinal disorder showed leaves only in 3 and fingers and leaves in 17. The mean total lymphocyte counts/1000 epithelial cells in the control group was 159 ± SE 13. In the patients with dermatitis herpetiformis the mean lymphocyte count/1000 epithelial cells was 464 ± SE 27 for the flat biopsies, 365 ± SE 59 for the convoluted biopsies, 535 ± SE 39 for the leaves only biopsies, and 301 ± SE 31 for the fingers and leaves biopsies. The counts for all 4 groups were significantly greater than in the control group. Three of the 43 patients with dermatitis herpetiformis had lymphocyte counts below 200/1000 epithelial cells: 4 controls had counts greater than 200 but none above 300. In the control group the mean count for lymphocytes in the basal position of the intestinal epithelium was 79 ± SE 8; in the dermatitis herpetiformis group the count was 89 ± SE 11 for flat biopsies, 93 ± SE 12 for convoluted biopsies, 121 ± SE 18 for the leaves only biopsies, and 98 + SE 13 for the fingers and leaves. However, the mean lymphocyte count in the perinuclear position was 81 ± SE 7 for controls, 362 ± SE 23 for the flat dermatitis herpetiformis biopsies, 251 ± SE 46 for the convoluted specimens, 402 ± SE 23 for the leaves only specimens, and 195 ± SE 25 for the fingers and leaves biopsies. The mean lymphocyte count for the supranuclear position was 0.55 ± SE 0.22 for control biopsies, 13.7 + SE 2.3 for the flat dermatitis herpetiformis biopsies, 20.0 ± SE 6.9 for the convoluted biopsies, 14.5 ± SE 3.3 for the leaves only biopsies, and 8.3 ± 2.6 for the fingers and leaves biopsies. Thus, in gluten-sensitive enteropathy the increase in lymphocytes in the intestinal epithelium is in the perinuclear and supranuclear position.

9310 ILEAL ATRESIA WITH SMALL BOWEL VOLVULUS IN A NEONATE. *(E.)* Gates, G. F.; Kanchanapoom, V. (Stanford Med. Ctr., California). *J. Pediatr. Surg.* 9(6):917-918, 1974.

9311 INCIDENCE OF MECKEL'S DIVERTICULUM IN 100 CADAVERS. *(E.)* Rojhan, M. S.; Hejazi, R. (Sch. Med., Tehran Univ., Iran). *Postgrad. Med. J.* 50(589):694-701, 1974.

9312 ADYNAMIC ILEUS, ITS PATHOGENESIS AND TREATMENT. *(E.)* Furness, J. B.; Costa, M. (Dept. Zool., Univ. Melbourne, Australia). *Med. Biol.* 52(2):82-89, 1974.

9313 EFFECT OF THE RESECTION OF THE ILEUM ON EXPERIMENTAL ATHEROSCLEROSIS. *(Ger.)* Ihasz, M.; Krasznai, A.; Koiss, I. (Semmelweis Med. Univ., Budapest, Hungary). *Z. Exp. Chir.* 6(4):275-282, 1973.

9314 THE USE OF ^{99m}TECHNETIUM PERTECHNETATE TO DETECT TRANSPLANTED GASTRIC MUCOSA IN THE DOG. *(E.)* Priebe, Jr., C. J.; Marsden, D. S.; Lazarevic, B. (Roosevelt Hosp., New York, N.Y.). *J. Pediatr. Surg.* 9(5):605-613, 1974.

9315 SMALL-BOWEL METASTASES FROM CARCINOMA OF THE BREAST. *(E.)* Fraser-Moodie, A. (Roy. Postgrad. Med. Sch., London, England). *Proc. R. Soc. Med.* 67(10):1023-1024, 1974.

9316 PERFORATED CYSTIC LEIOMYOMA OF THE ILEUM: REPORT OF A CASE. *(E.)* Wilk, P. J.; Cornell, A.; Haimov, M. (Mt. Sinai Hosp., New York, N.Y.). *Mt. Sinai J. Med. NY* 41(4):549-552, 1974.

9317 CLINICAL AND RADIOLOGICAL CONSIDERATIONS OF DUODENAL POLYPS. *(It.)* Tagliaferri, G.; Appicciutoli, L.; Preziosi, M.; Perozzi, A. (Santo Spirito Hosp., Sassia, Italy). *Chir. Gastroenterol.* 7(4):509-516, 1973.

9318 ENTEROLITHS IN THE ILEUM. *(E.)* Weiss, O.; (VA Hosp. Lyons, N.J.). *Am. J. Proctol.* 25(6):69-72, 1974.

9319 CONGENITAL INTRINSIC DUODENAL OBSTRUCTION: A TWENTY-YEAR REVIEW OF ITS SURGICAL MANAGEMENT AND CONSEQUENCES. *(E.)* Girvan, D. P.; Stephens, C. A. (Hosp. Sick Children, Toronto, Canada). *J. Pediatr. Surg.* 9(6)833-840, 1974.

9320 INTESTINAL OBSTRUCTION. A COMPLICATION OF INDUCED ABORTION BY "SALTING OUT". *(E.)* Alankar, K.; Sama, J. C.; Saha, B.; Lazaro, E. J. (New Jersey Med. Sch., Newark). *Obstet. Gynecol.* 44(2):278-280, 1974.

9321 INHIBITION OF ANAEROBIC BACTERIAL GROWTH IN THE SMALL BOWEL BY BILE SALTS. *(E.)* Williams, R. C.; Winterton, R.; Savage, D.; Kern, Jr., F. (Univ. Colorado Med. Ctr., Denver). *Gastroenterology* 66(4):799, 1974.

9322 DUODENAL MUCOSAL RESPONSE TO THE PUNGENT PRINCIPLE OF HOT PEPPER (CAPSAICIN) IN THE RAT: LIGHT AND ELECTRON MICROSCOPIC STUDY. *(E.)* Nopanitaya, W.; Nye, S. W. (Sch. Med., Univ. North Carolina, Chapel Hill). *Toxicol. Appl. Pharmacol.* 30(1):149-161, 1974.

9323 LYSOZYMES IN FECES FROM INFANTS AND CHILDREN. *(E.)* Haneberg, B.; Finne, P. (Univ. Bergen, Sch. Med., Norway). *Acta Paediatr. Scand.* 63(4):588-594, 1974.

9324 CHARACTERIZATION OF LYMPHOCYTES ISOLATED FROM HUMAN SMALL INTESTINE. *(E.)* Breucha, G.; Rieber, E. P.; Riethmuller, G. (Surg. Clin., Univ. Tubingen, Germany). *Eur. Surg. Res.* 6(1):38, 1974.

9325 TRANSPOSITION TO THE DUODENUM OF THE EFFERENT LOOP IN POSTCIBAL AND NUTRITIONAL SYNDROMES AFTER BILLROTH II. *(It.)* Petrin, C.; Baldrati, F.; Fayenz, S.; Nucifora, R.; Cossar, G. (Dept. Surg., Prov. Gen. Hosp., Gorizia, Italy). *Chir. Gastroenterol.* 7(4):428-435, 1973.

See also, 9200, 9257, 9336, 9373, 9609, 9619, 9625, 9633, 9655, 9678, 9681, 9682.

SMALL INTESTINE

Malabsorption

326 MALABSORPTION IN OVERLAND TRAVELLERS TO INDIA. *(E.)* Tomkins, A. M.; James, W. P. .; Walters, J. H.; Cole, A. C. E. (London Sch. Hyg. rop. Med., England). *Br. Med. J.* 3(5927):380-384, 974.

alabsorption occurred in 28 men and 6 women (mean age, 25 yr) after brief periods of overland travel to India. Symptoms included diarrhea, abdominal distension, and weight loss. Investigation revealed steatorrhea in 29 (fecal fat, mean 15.2 g/day), xylose malabsorption in 33 (5-hr urinary excretion after a 25-g p.o. load, mean 2.2 g), and vitamin B_{12} malabsorption in 11 of 12 (2.9% of a 1-mg dose excreted).

Serum folate and vitamin B_{12} levels were lower in those with protracted diarrhea, but no anemia developed. Under the dissecting microscope, jejunal biopsies showed leaves, ridges, and convolutions. Light microscopy revealed shortened villi with infiltrations of lamina propria and epithelium by plasma cells and lymphocytes. Tropical sprue in these patients may have resulted from folate deficiency caused by methods of food preparation known to deplete the diet of folate. Once tropical sprue is established, further folate depletion can occur as dietary folate is consumed by bacteria, fails to be hydrolyzed from the polyglutamate form, and is excessively excreted in the feces.

9327 SPRUE IN THE MIDDLE EAST: FIVE CASE REPORTS. *(E.)* Haeney, M. R.; Montgomery, R. D.; Schneider, R. (East Birmingham Hosp., England). *Gut* 15(5):377-386, 1974.

Five patients (4 men, 1 woman, aged 20-64 yr) are presented whose symptoms of unexplained malabsorption began during a period of residence in the Middle East or Mediterranean areas. On the basis of malabsorption of 2 or more unrelated substances, the clinical features of the 5 cases were indistinguishable from tropical sprue as seen in the accepted endemic zones. Anemia was not present in this series due to the short duration of symptoms (3-18 months) and the good nutritional stores of the patients. A normal FIGLU excretion in the 2 patients tested was also a reflection of the short symptomatic period. Variations in serum folate and in malabsorption of fat, xylose, or vitamin B_{12} appeared related to the duration of the disorder as well as to individual nutritional reserves. Bacterial overgrowth in the jejunum was seen in 2 cases and in all 5 cases the morphological appearance of the jejunal biopsy conformed to the spectrum of characteristic but nonspecific changes in tropical sprue.

9328 DIARRHEA ASSOCIATED WITH MEDULLARY CARCINOMA OF THE THYROID: STUDIES OF INTESTINAL FUNCTION IN A PATIENT. *(E.)* Isaacs, P.; Whittaker, S. M.; Turnberg, L. A. (Manchester Roy. Infirm., England). *Gastroenterology* 67(3):521-526, 1974.

Investigation of small intestinal function in a 40-yr-old man with diarrhea associated with a medullary carcinoma of the thyroid indicated that jejunal transport of electrolytes, mucosal permeability, and intestinal transit were all normal. The ileum, however, was unable to absorb Na^+ and Cl^- against a concentration gradient, had an abnormal mucosal permeability, and had an abnormally rapid mean transit time, These disorders of ileal function could clearly account for the diarrhea. Prostaglandin secretion by the tumor did not appear responsible for the intestinal abnormalities since plasma prostaglandin levels were normal on 3 occasions and slightly elevated on 1. Indomethacin (50 mg 3 times/day for 8 weeks), a known inhibitor of prostaglandin synthesis, failed to influence the diarrhea in this patient.

9329 MALABSORPTION OF VITAMIN B_{12} AFTER VAGOTOMY. *(E.)* Streeter, A. M.; Duraiappah, B.; Boyle, R., O'Neill, B. J.; Phelis, M. T. (Repatriation Gen. Hosp., Concord, New South Wales, Australia). *Am. J. Surg.* 128(3):340-343, 1974.

Absorption of ^{57}Co vitamin B_{12} bound to chicken serum (0.8-1.0 μg p.o.) was studied in 20 patients more than 5 yr after they had undergone vagotomy and a drainage procedure. All 12 patients with successful vagotomy showed malabsorption of the bound ^{57}Co B_{12} (urinary excretion below 0.5%). Seven of the 8 patients with unsuccessful vagotomy had normal absorption (urinary excretion above 0.5%). Plasma levels after administration of bound ^{57}Co B_{12} showed a similar pattern although there was more overlap between groups.
The amount of ^{57}Co B_{12} absorbed by the postvagotomy patients was roughly proportional to their gastric output measured before and after insulin stimulation. Hydrochloric acid was shown to release bound ^{57}Co B_{12} *in vitro*, the proportion released ranging from 40% at low acid concentrations to 20% at concentrations of 40-200 mEq/liter. The release of bound B_{12} by acid *in vitro* and the rough correlation between gastric acidity and bound vitamin B_{12} by acid *in vitro* indicate that acidity may be a critical factor in the release of vitamin B_{12} from food stores prior to absorption. Thus, any disease or surgical procedure that substantially reduces gastric acid may reduce absorption of protein-bound vitamin B_{12}. The test of absorption of bound vitamin B_{12} may be a convenient substitute for the Hollander insulin test.

9330 RELATIVE VALUE OF TESTS FOR INTESTINAL MALABSORPTION. *(E.)* Moshal, M. G.; Hift, W.; Spitaels, J. M.; Pillay, K. (Dept. Med., Univ. Natal, Durban, South Africa). *S. Afr. Med. J.* 48(31):1338-1340, 1974.

9331 CLINICAL STUDY OF MALABSORPTIONS. *(Fr.)* Jankowski, J. M. (Fac. Med., Tours, France). *Ouest Medical* 26(3):253-260, 1973.

9332 CHRONIC TROPICAL SPRUE AND PERNICIOUS ANAEMIA IN A YOUNG INDIAN MAN. *(E.)* Kalro, R. H.; Stewart, J. S. (West Middlesex Hosp., Isleworth, England). *Proc. R. Soc. Med.* 67(10):1021-1022, 1974.

See also, 9178, 9219, 9254, 9307, 9325, 9666, 9676.

333 EPITHELIAL PROLIFERATION AND MORPHOGENESIS OF HYPERPLASTIC ADENOMATOUS AND VILLOUS
'OLYPS OF THE HUMAN COLON. *(E.)* Wiebecke, B.;
randts, A.; Eder, M. (Inst. Pathol., Univ. Munich,
ermany). *Virchows Arch.* [*Pathol. Anat. Histol.*]
64(1):35-49, 1974.

he morphogenetic mechanisms in the development of
olonic polyps were deduced from the structure of the
ucous membrane and the distribution of epithelial
roliferation in various layers of the mucosa. The
tructure of the mucosa was demonstrated by graphical-
erspective partial reconstruction; the parameter of
roliferation activity was the mitotic index. The
aximum of the mitotic index in normal and hyper-
lastic mucous membranes was close to the base, where-
s in villous and adenomatous polyps it was unequi-
ocally shifted to the membrane surface. Mucosal
eight and the size of the proliferation zone in-
reased progressively in the sequence from normal
ucosa through hyperplastic polyps to adenomatous
nd villous polyps. Graphical reconstruction showed
hat hyperplastic polyps develop by lengthening and
nlargement of the crypts due to increased supply of
ells from an extended but normally located regen-
ration zone. Adenomatous and villous polyps are
ased on a loss of epithelial differentiation and
he shifting of proliferation activity to the upper
ayers of the mucosa. The increased epithelial
roliferation close to the surface induces a secon-
ary stroma proliferation that results in glandular
ivision and horizontal expansion of adenomatous
olyps. In villous polyps, a predominantly vertical
rowth with villus formation takes place. Most
olyps are probably villous, adenomatous, or of mixed
ype from their inception.

334 PHASE 1 and PHASE 2 PROLIFERATIVE LESIONS OF COLONIC EPITHELIAL CELLS IN DISEASES
EADING TO COLONIC CANCER. *(E.)* Lipkin, M. (Mem.
loan-Kettering Cancer Ctr., New York, N.Y.). *Cancer*
4(3)suppl.:878-888, 1974.

he proliferation of colonic epithelial cells during
eoplastic transformation was studied in 3 groups:
1) patients who develop either isolated polyps,
illous adenomas, or carcinomas; (2) patients with
amilial polyposis; and (3) mice given the carcino-
en 1,2-dimethylhydrazine. Colonic epithelial cells
n man begin to develop some of the characteristics
f malignant cells while they still appear normal
n conventional morphological examination. The cells
ass through specific phases during which they ex-
ress increasingly abnormal proliferative character-
stics. As a Phase 1 proliferative lesion develops,
olonic epithelial cells do not repress DNA synthe-
is during their maturation, and begin to develop an
nhanced ability to proliferate. The overall kinet-
cs of cell proliferation remain normal, without a
et retention or accumulation of cells in the mucosa.
s a Phase 2 proliferative lesion forms, the cells
egin to develop properties that enable them to be
etained in the mucosa in increasing numbers. The
verall kinetics of cell proliferation become ab-
ormal, and net retention and accumulation of cells
egin to be observed. These changes are accompanied by differentiation-specific molecular errors, resulting in the abnormal persistence of metabolic pathways leading to enhanced DNA synthesis. These proliferative cellular lesions arise in hereditary familial polyposis in man, in individuals in the general population who develop isolated colonic neoplasms, and in rodents after a chemical carcinogen is given, suggesting that they are major steps on a final common molecular pathway leading to malignant transformation. Their expression is accelerated in familial polyposis. The proliferative lesions and increasingly severe degrees of cellular atypia can be screened in familial polyposis. The utility of the screening procedure is being studied.

9335 EOSINOPHILIC ARGENTAFFIN CELLS IN THE HUMAN APPENDIX. *(E.)* Millikin, P. D. (Peoria-Tazewell Pathol. Group, Ill.). *Arch. Pathol.* 98(6): 393-395, 1974.

One hundred normal appendices, removed incidental to other abdominal surgery, and 24 appendices from patients with acute appendicitis were examined for the presence of eosinophilic argentaffin cells. The normal specimens were removed from 19 male and 81 female patients (9 to 82 yr) and the appendicitis specimens from 12 male and 12 female patients (7 to 83 yr). The specimens were brightly eosinophilic after being fixed for 6-9 hr in formaldehyde solution and stained with hematoxylin and acidified eosin. The eosinophilic cells were photographed, destained, and then restained by one of three different enterochromaffin methods (silver stain, ferricyanide stain, and a diazo method using fast red B), giving a positive reaction in every case. These cells are a normal component of the appendiceal crypts (100/100 normal cases) but fewer of them were found in cases of acute appendicitis (16/24 cases). There were no differences according to age or sex.

9336 INTESTINAL COMPLICATIONS IN RHEUMATOID ARTERITIS AND THEIR RELATIONSHIP TO CORTICOSTEROID THERAPY. *(E.)* Prillaman, W. W.; Hurst, D. C.; Ball, G. V.; Bennett, J. C. (Univ. Alabama Med. Ctr., Birmingham). *J. Chronic Dis.* 27(9/10): 475-481, 1974.

Case reports of 1488 patients with rheumatoid arthritis were reviewed for intestinal arteritis as a complication of rheumatoid arteritis and for a possible relation between the complication and previous steroid therapy. Rheumatoid arteritis was found in 254 patients, 144 of whom had received steroids. Intestinal arteritis was described in 43 patients (31 men, 6 women, sex unknown in 6 cases). Site of the lesion was the small bowel alone in 12 patients, colon alone in 12, both in 7, and unknown in 12. Of the 43 patients, 31 had received steroids immediately prior to onset of clinical arteritis, 9 had not, and in 3 steroid therapy was not described. Most (84%) of the steroid-treated patients had received maintenance doses (> 7.5 mg prednisone or equivalent dose of another steroid). The steroid and non-steroid treated groups did not differ in age of onset, duration, or staging of arthritis. Further comparison between the 2 groups showed no significant difference in occurrence of intestinal complications, histology of the lesions, or number of lesions/patient as a cause of death. From these observations it appears that steroid therapy neither causes nor aggravates arteritis in rheumatoid disease.

9337 CANCERS OF THE COLON. *(Fr.)* Aron, E. (no affil.). *Ouest Med.* 26(21):2225-2230, 1973.

9338 A COMPARATIVE STUDY OF THE DIAGNOSTIC BASIS FOR CANCER OF THE COLON AND CANCER OF THE RECTUM IN DENMARK AND FINLAND. *(E.)* Jensen, O. M.; Mosbech, J.; Salaspuro, M.; Jhamaki, T. (Copenhagen County Hosp., Denmark). *Int. J. Epidemiol.* 3(2):183-186, 1974.

9339 HEMANGIOMAS OF THE COLON, RECTUM, AND ANUS. *(E.)* Allred, Jr., H. W.; Spencer, R. J. (Mayo Grad. Sch. Med., Univ. of Minnesota, Rochester). *Mayo Clin. Proc.* 49(10):739-741, 1974.

9340 THE FUNCTION OF AUTONOMIC-ADRENAL SYSTEM AND ADRENAL CORTEX IN PATIENTS WITH CANCER OF THE RECTUM. *(Rus.)* Dedkov, I. P.; Tarutinov, V. I. (Kiev Res. Inst. Roentgenol. Oncol., USSR). *Vrach. Delo* (8):56-62, 1974.

9341 FURTHER INVESTIGATION OF THE INCREASED TRANSFER RIBONUCLEIC ACID METHYLASE ACTIVITY IN TUMOURS OF THE MOUSE COLON. *(E.)* Pegg, A. E.; Hawks, A. M. (Middlesex Hosp. Med. Sch., London, England). *Biochem. J.* 137(2):229-238, 1974.

9342 LONG-TERM RESULTS OF SURGICAL TREATMENT OF CANCER OF THE COLON AND RECTUM. *(It.)* Colombo, C.; Lombardo, S.; Ramella, A. (San Giovanni Battista Principal Hosp., Turin, Italy). *Chir. Gastroenterol.* 7(4):449-468, 1973.

9343 CARCINOEMBRYONIC ANTIGEN IN MANAGEMENT OF COLORECTAL CARCINOMA. *(E.)* Booth, S. N.; Jamieson, G. C.; King, J. P. G.; Leonard, J.; Oates, G. D.; Dykes, P. W. (Dept. Exp. Pathol., Univ. Birmingham, England). *Br. Med. J.* 4(5938):183-187, 1974.

9344 A PILOT STUDY FOR THE EVALUATION OF A NEW REGIME OF COMBINED THERAPY FOR THE RADICAL TREATMENT OF MARGINALLY OPERABLE RECTAL (OR COLO-RECTAL) CANCER. *(E.)* Wassif, S. B. (Radiother. Inst., Rotterdam, Netherlands). *Eur. J. Cancer* 10(9):615-619, 1974.

9345 PELVIC LYMPHADENECTOMY IN CANCER OF THE RECTUM. *(Rus.)* Koschug, S. D.; Kukute, B. G. (Moldavia Res. Inst. Oncol., USSR). *Vopr. Onkol.* 20(9):62-64, 1974.

9346 PRIMARY LINITIS PLASTICA CARCINOMA OF THE COLON. *(E.)* Bashour, T.; Goldman, M. L.; Gerber, L.; Danovitch, S. H. (District of Columbia Gen. Hosp.). *Med. Ann. D.C.* 43(11):549-552, 1974.

9347 DIFFUSE LYMPHOSARCOMA OF THE COLON SIMULATING ULCERATIVE COLITIS. *(E.)* Parnes, I. H.; Warner, R. R. P.; Berman, R.; Sanders, M. (Mt. Sinai Sch. Med., New York, N.Y.). *Mt. Sinai J. Med. NY* 41(6):802-806, 1974.

9348 EPIDERMOID CYSTS AND POLYPOSIS COLI. *(E.)* Leppard, B. J. (St. John's Hosp. Dis. Skin, London, England). *Proc. R. Soc. Med.* 67(10):1036-1037, 1974.

9349 DIVERTICULAR DISEASE OF RIGHT COLON: REPORT OF 7 POST-MORTEM CASES. *(E.)* Pace, J. L.: Podesta, M. T. (Roy. Univ. Malta). *Proc. R. Soc. Med.* 67(10):1044, 1974.

9350 RETROPERITONEAL FIBROSIS WITH BOWEL OBSTRUCTION. PRESENTATION OF ONE CASE. *(E.)* Cauble, W. G. (no affil.). *Am. J. Proctol.* 25(6):75-79, 1974.

9351 SOLITARY RECTAL ULCER: A CAUSE OF LIFE-THREATENING HEMORRHAGE. *(E.)* Delancy, H.; Hitch, W. S. (Mem. Med. Ctr., Savannah, Ga.). *Surgery* 76(5):830-832, 1974.

9352 "INTERSPLANCHNIC STEAL SYNDROME": ANOTHER CAUSE FOR REVERSIBLE DISTAL COLON ISCHAEMIA *(E.)* Kinkhabwala, M.; Rabinowitz, J. G.; Dallemand, S.; Iyer, S. (Kings County Hosp. Ctr., Brooklyn, N.Y.). *Br. J. Radiol.* 47(562):729-732, 1974.

9353 THE MANAGEMENT OF CHRONIC FUNCTIONAL CONSTIPATION IN THE SEVERELY INCAPACITATED, AGED NURSING HOME PATIENT. *(E.)* DeLuca, Jr., V. A.; Carrillo, H.; Clark, H. M.; Phipps, D. L.; Pratt, F. (Griffin Hosp., Derby, Conn.). *Med. Counterpoint* 6(10):25-27, 44, 1974.

9354 COLONOSCOPY — PRELIMINARY REVIEW OF SURGICA APPLICATIONS. *(E.)* Shapiro, B. S.; Hoffer J. M. (Griffin Hosp., Derby, Conn.). *Conn. Med.* 39(1 6-7, 1975.

9355 THE DIFFERENTIAL DIAGNOSTIC VALUE OF THE DISEASES OF THE COLON IN GYNECOLOGY. *(Ger.* Carol, W. (Dept. Gynecol., Friedrich-Schiller Univ., Jena, Germany). *Z. Aerztl. Fortbild.* 68(3):125-128, 1974.

9356 ADENOCARCINOMA OF THE APPENDIX. CLINICAL FINDING. *(It.)* Luccioli, G. M.; Girolimoni, G.; Consiglio, L.; Dini, I. (Prov. Gen. Hosp., Castello, Italy). *Chir. Gastroenterol.* 7(4):517-532, 1973.

9357 ADENOCARCINOMA OF THE APPENDIX VERMIFORMIS. *(E.)* Moss, D. I.; (Roy. Melbourne Hosp., Australia). *Aust. NZ J. Surg.* 44(2):140-142, 1974.

9358 PRIMARY ADENOCARCINOMA OF THE VERMIFORM APPENDIX. *(E.)* Greenhalgh, R. M. (St. Bartholomew's Hosp., London, England). *Proc. R. Soc. Med.* 67(10):1025, 1974.

9359 ANALYSES OF CASES OF PERFORATIVE APPENDICITIS IN THE ANNABERG REGIONAL HOSPITAL DURING THE 1954-1968 PERIOD. *(Ger.)* Laube, J.; Weise, G. (Reg. Hosp., Annaberg-Buchholz, Germany). *Z. Aerztl. Forbild.* 68(4):178-182, 1974.

See also, 9060, 9200, 9215, 9216, 9220, 9252, 9323, 9468, 9625, 9628, 9668, 9669, 9671, 9673.

LARGE INTESTINE

Ulcerative Colitis

9360 BILIARY TRACT CARCINOMA ASSOCIATED WITH ULCERATIVE COLITIS. *(E.)* Ritchie, J. K.; Allan, R. N.; Macartney, J.; Thompson, H.; Hawley, P. R.; Cooke, W. T. (St. Mark's Hosp., London, England). *Q. J. Med.* 43(170):263-279, 1974.

A biliary tract tumor was documented in 15 patients (9 men and 6 women) with ulcerative colitis. Most patients had both a long history of colitis and total involvement of the colon. Seven of the patients were managed medically for the colitis and in 8 total proctocolectomy was carried out. In the latter group, the tumor was diagnosed 3-13 yr after surgery. The site of the tumor was the gallbladder in 1 patient, intrahepatic bile duct in 1, and extrahepatic bile duct in 13. In 8 cases the biliary tract tumor was found at postmortem and in 4 cases there was operative evidence of the diagnosis together with biopsy data. No surgical treatment of the tumor was possible in 3 of the 4 cases. Three patients underwent excision of the tumor and 2 underwent palliative bypass surgery; the longest survival in operated patients was 19 months. Histological study revealed that the tumors were adenocarcinomas of varying degrees of differentiation. Mucin secretion was a variable feature. A scirrhous reaction in the stroma was frequently seen at the site of the primary growth in bile ducts. It is suggested that biliary tract tumors are approximately 10 times more frequent in patients with ulcerative colitis than in the general population.

9361 ULCERATIVE PROCTITIS. *(E.)* McKechnie, J. C.; Bynum, T. E.; Bentlif, P. S.; Lanza, F. L. (Baylor Coll. Med., Houston, Tex.). *South. Med. J.* 67(9):1052-1056, 1974.

9362 STEROIDS, HYPERTENSION, AND FLUID RETENTION IN THE GENESIS OF POSTOPERATIVE SEIZURES WITH INFLAMMATORY BOWEL DISEASE IN CHILDHOOD. *(E.)* Levine, A. M.; Pickett, L. K.; Touloukian, R. J. (Yale Univ. Sch. Med., New Haven, Conn.). *J. Pediatr. Surg.* 9(5):715-724, 1974.

9363 FULMINATING ULCERATIVE COLITIS IN PREGNANCY. *(E.)* Georgy, F. M. (Allentown Hosp., Pa.). *Obstet. Gynecol.* 44(4):603-605, 1974.

See also, 9347, 9579, 9688.

PANCREAS

9364 CYTODIAGNOSIS OF PANCREATIC MALIGNANT TUMORS BY ASPIRATION, UNDER DIRECT VISION, USING A DUODENAL FIBERSCOPE. *(E.)* Endo, Y.; Morii, T.; Tamura, H.; Oruda, S. (Ctr. Adult Dis., Osaka, Japan). *Gastroenterology* 67(5):944-951, 1974.

Duodenal endoscopic examinations with cytodiagnosis by direct aspiration and retrograde pancreatography were performed on 160 patients with suspected pancreatic disease, particularly malignant tumors. Positive results were obtained cytologically in 22 cases with no false-positive results, i.e. in 79% of the 29 cases of malignant pancreatic tumors confirmed at operation or autopsy. The 22 cases consisted of 15 of 16 cases of cancer of the pancreatic head with duodenal invasion, 4 of 6 cases of cancer of the pancreatic head without duodenal invasion, 2 of 6 cases of cancer of the body and tail of the pancreas, and the 1 case of cancer of the ductal spreading type. Aspiration of pure pancreatic juice collected from the pancreatic duct gave a positive diagnosis in 11 of 14 cases. Of the 3 negative cases, 1 cancer of the pancreatic head with duodenal invasion was confirmed histologically as an islet cell carcinoma. In the other 2 cases, cancer of the pancreatic tail was located at a distance from the papillary orifice. Diagnosis by endoscopy alone was relatively successful only in cases of cancer of the pancreatic head with duodenal invasion (9 of 16 cases). Retrograde pancreatography with a duodenal fiberscope gave a definite diagnosis in 12 cases: 5 cases of cancer of the pancreatic head with duodenal invasion, 3 cases without duodenal invasion, and 4 cases of cancer of the body and tail of the pancreas. It is concluded that cytodiagnosis is the most reliable method available for diagnosis of intrapancreatic cancer.

9365 HYPOTONIC DUODENOGRAPHY IN SUSPECTED PANCREATIC DISEASE.

(E.) Shirley, D. V. (Hammersmith Hosp., London, England). *Br. J. Radiol.* 47(560):437-443, 1974.

On completion of secretion testing, hypotonic duodenography was carried out in 60 patients with suspected pancreatic disease. Of the 46 patients with a final diagnosis of no pancreatic disease, 42 had normal duodenograms. Findings unrelated to pancreatic disease included 1 lymphoma of the duodenum, 1 large diverticulum of the 4th part, and 1 diverticulum plus pancreatic calcification. Only 3 of 7 cases of proven chronic pancreatitis were diagnosed by hypotonic duodenography. The only diverticula arising from the 2nd part of the duodenum were found in patients (2) with chronic pancreatitis. Six of 7 cases of carcinoma of the pancreas were diagnosed preoperatively by duodenography; in all 6 cases the carcinoma was in the region of the head. The 7th patient had a carcinoma of the body of the pancreas at laparotomy, but the duodenogram appeared normal. Carcinoma was wrongly suggested by duodenograms in 1 patient with no pancreatic disease and 1 with chronic pancreatitis. Carcinoma of the pancreas was present in 5 of 12 patients presenting with obstructive jaundice.

9366 RAPID GASTRIC EMPTYING OF FATTY MEALS IN PANCREATIC INSUFFICIENCY.

(E.) Long, W. B.; Weiss, J. B. (Philadelphia Gen. Hosp., Pa.). *Gastroenterology* 67(5):920-925, 1974.

To determine whether maldigestion leads to aberrations in gastric emptying of liquid fatty meals, gastric emptying was studied in 7 patients with pancreatic insufficiency (6 men and 1 woman, aged 29-55 yr) and in 10 normal controls (6 men and 4 women, aged 21-55 yr). The patients had chronic calcific pancreatitis, steatorrhea, and diabetes mellitus. Gastric emptying of meals was determined by serial dilutions of phenol red (750 mg) given by gastric tube. One hr after ingestion, 36.8 ± 5.1% of fatty meals remained in the stomach of normal subjects, while only 3.9 ± 1.1% remained in the stomach of patients. The amount remaining at 30 min in normal subjects also exceeded that in patients (75.8 ± 6.9 *versus* 27.8 ± 4.6%). These differences were significant. A heat-labile factor in dessiccated porcine pancreas (Viokase, six 0.3 g tablets mixed with the meal) significantly retarded emptying of fatty meals in patients (40.3 ± 6.3% of the mean remained at 60 min). Viokase increased gastric pH 60 min after a fatty meal from a mean of 4.6 to 5.2. It did not alter emptying rate of 5% glucose in water meals. It is concluded that abnormally rapid emptying of fatty liquid meals in patients with pancreatic insufficiency is probably due to maldigestion. Enzyme replacement improves digestion and this in turn inhibits gastric emptying.

9367 PANCREATIC SECRETION OF CALCIUM IN HEALTHY SUBJECTS AND VARIOUS DISEASES OF THE PANCREAS.

(E.) Gullo, L.; Sarles, H.; de Barros Mott, C.; Tiscornia, O.; Pauli, A. M.; Pastor, J. (Res. Unit Dig. Dis., INSERM, Marseille, France). *Rend. Gastroenterol.* 6(1):35-44, 1974.

Calcium secretion in duodenal juice was measured before and after secretin (1 U/kg) and pancreozymin (3 U/kg) administration in 36 normal subjects and 132 patients with pancreatic or nonpancreatic disease. Patients who had undergone cholecystectomy had a smaller increase in calcium concentration than normal subjects following secretin and pancreozymin injection. In patients with various diseases of the digestive tract but no pancreatic involvement, the calcium concentration did not differ from that in controls. In contrast, patients with disease of the pancreas (chronic pancreatitis with or without calcification, acute pancreatitis, diabetes, or cancer) had increased calcium concentrations compared with controls. The increase was seen both in the basal secretion and in the samples collected after injection of secretin and pancreozymin. The rise was not related to enzyme (amylase) or bicarbonate secretion. The absence of a marked rise in calcium levels in the postcholecystectomy patients indicates that increased concentrations after secretin and pancreozymin administration are mainly due to calcium-rich gallbladder bile entering the duodenum. Results for the patients with pancreatic disease suggest that measurement of duodenal juice calcium concentration could be a useful diagnostic tool. The concentration before and after secretin and pancreozymin may accurately reflect the presence of pathological pancreatic lesions, regardless of their nature. Since calcium concentration increased to the same extent in pancreatic diseases with and without calcification, the increased concentration is not in itself a cause of calcified stones in the pancreatic ducts.

9368 EXPERIENCES IN THE MANAGEMENT OF CANCER OF THE HEAD OF THE PANCREAS. *(E.)* Maingot, R. (Southend Gen. Hosp., London, England). *Br. J. Clin. Pract.* 28(8):273-278, 1974.

9369 RADIOLOGIC NOTES. CASE NO. 379. *(E.)* Block, C.; Peck, H. M. (Mt. Sinai Sch. Med., New York, N.Y.). *Mt. Sinai J. Med. NY* 41(4):597-599, 1974.

9370 PANCREATIC IMPLANTATION INTO THE PYLORUS; A MODIFICATION OF WHIPPLE'S PROCEDURES. *(E.)* Papaevangelou, E.; Peveretos, P.; Koutroubas, K. (Red Cross Hosp., Athens, Greece). *Eur. Surg. Res.* 6(1):59, 1974.

9371 PANCREATIC HETEROTOPIA WITH ABSCESS FORMATION IN THE STOMACH. *(E.)* Wychulis, A. R.; Sasso, A.; Carnes, R. (Saint Michael's Med. Ctr., Newark, N.J.). *J. Med. Soc. NJ* 71(8):558-561, 1974.

9372 COMPARATIVE DOUBLE BLIND EXPERIMENT WITH A POLYENZYMATIC PREPARATION IN CHRONIC PANREATIC INSUFFICIENCY. *(Fr.)* Knill-Jones, R. P.; Pearce, H.; Batten, J.; Williams, R. (King's Coll. Hosp., London, England). *Acta Gastroenterol. Belg.* 36(9):489-504, 1973.

9373 DUODENAL JUICE EXAMINATION AND Se^{75}-METHIONINE ELIMINATION IN PANCREATIC DAMAGE. *(It.)* Scortecci, V.; Poma, S. (Inst. Surg. Pathol., Univ. Milan, Italy). *Chir. Gastroenterol.* 7(4):469-484, 1973.

9374 STANDARDIZED ASSAY FOR THE SODIUM REABSORPTION INHIBITORY EFFECT AND STUDIES OF ITS SALIVARY GLAND DISTRIBUTION IN PATIENTS WITH CYSTIC FIBROSIS. *(E.)* Taylor, A.; Mayo, J. W.; Boat, T. F.; Matthews, L. W. (Case Western Reserve Univ. Sch. Med., Cleveland, Ohio). *Pediatr. Res.* 8(11):861-865, 1974.

9375 BILE SALT KINETICS IN CYSTIC FIBROSIS (CF): INFLUENCE OF PANCREATIC ENZYME REPLACEMENT. *(E.)* Watkins, J. B.; Tercyak, A. M.; Szczepanik, P.; Klein, P. D. (Children's Hosp. Med. Ctr., Boston, Mass.). *Gastroenterology* 67(4):835, 1974.

See also, 9219, 9386, 9648.

PANCREAS

Pancreatitis

9376 SECRETORY PATTERNS IN MINIMAL PANCREATIC INFLAMMATORY PATHOLOGIES. *(E.)* Dreiling, D. A.; Bordalo, O. (Mount Sinai Sch. Med., New York, N.Y.). *Med. Chir. Dig.* 2(5):269-274, 1973.

Standard secretin test data and augmented secretin test data were analyzed for patients with alcoholic pancreatitis, biliary tract pancreatitis, and for alcoholics without signs of pancreatitis or cirrhosis. In patients with chronic pancreatitis, maximum bicarbonate concentration and 80-min bicarbonate secretion were significantly below the lower limit of normal statistical ranges. In contrast, 80-min average flows for alcoholic and biliary tract pancreatitis were well above the lower limit of normal. Alcoholics without pancreatitis or cirrhosis showed average high flow, normal but below average maximum bicarbonate concentrations, and normal but above average rate of bicarbonate secretion. These findings represent pancreatic hypersecretion as observed in alcoholic cirrhosis. Frequency distribution curves showed a bimodal or 2 population distribution for flow in both alcoholic and biliary tract chronic pancreatitis and a unimodal or normal distribution of values for maximum bicarbonate concentration in both groups. In each group, a significant number of patients had values in the hypersecretory ranges. The findings suggest that the initial post-secretin secretory pattern of minimal pancreatic inflammatory pathology is hypersecretion resulting from ductular reduplication and hypertrophy. With chronic inflammation and fibrosis, volume and bicarbonate concentration decline. A final stage of low flow, low bicarbonate, and low enzyme secretion corresponds to the more advanced pathologies of fibrosis, atrophy, and calcification.

9377 ACUTE PANCREATITIS. *(E.)* Wiltrakis, G. A.; Liesen, G. J.; Wiltrakis, M. G. (no affil.). *Abdom. Surg.* 16(10):291-293, 1974.

9378 ACUTE PANCREATITIS IN GREAT BRITAIN — A REVIEW. *(E.)* Trapnell, J. E. (Roy. Victoria Hosp., Bournemouth, England). *Med. J. Aust.* 2(12):450-455, 1974.

9379 DOES ACUTE PANCREATITIS RESULT IN CHRONIC PANCREATITIS? *(It.)* de Barros Mott, C.; Bettarello, A. (Hosp. Clin. Sao Paulo, Brazil). *G. Clin. Med.* 54(5):199-202, 1973.

9380 ACUTE PANCREATITIS IN PREGNANCY. *(Pol.)* Lukasiewicz, S.; Wysocki, R. (Prov. Hosp., Tychy, Poland). *Wiad. Lek.* 26(21):2015-2017, 1973.

9381 ACUTE PANCREATITIS IN WEST NILE FEVER. *(E.)* Perelman, A.; Stern, J. (Central Negev Hosp., Beersheva, Israel). *Am. J. Trop. Med. Hyg.* 23(6):1150-1152, 1974.

9382 EARLY DISSEMINATED LESIONS IN ACUTE PANCREATITIS. *(E.)* Vos, A.; Westbroek, D. L.; McDicken, I. (Med. Fac. Erasmus Univ., Rotterdam, Netherlands). *Eur. Surg. Res.* 6(1):58, 1974.

9383 PANCREATITIS PRESENTING AS UNEXPLAINED ASCITES. *(E.)* Kalwinsky, D.; Frittelli, G.; Oski, F. A. (Upstate Med. Ctr., Syracuse, N.Y.). *Am. J. Dis. Child.* 128(5):734-738, 1974.

9384 ARTERIAL HYPOTENSION AS A FACTOR AGGRAVATING THE HISTOLOGICAL DAMAGE IN EXPERIMENTAL ACUTE HAEMORRHAGIC PANCREATITIS. *(E.)* Nemeth, E. P.; Fodor, I.; Folly, G.; Papp, M. (Semmelweis Univ. Med. Sch., Budapest, Hungary). *Acta Morphol. Acad. Sci. Hung.* 21(4):319-332, 1973.

9385 TREATMENT OF CHRONIC PANCREATITIS BY TRIPLE TOTAL PANCREATOBILIODIGESTIVE BYPASS. *(E.)* Salembier, Y. A. (no affil.). *Int. Surg.* 259(11-12): 607-609, 1974.

9386 THE RELATION BETWEEN CHRONIC PANCREATITIS AND CANCER OF THE PANCREAS. *(Rus.)* Michailichenko, V. A.; Bruk, B. B.; Rovenskaia, N. M.; Tamarkin, M. A. (Donetsk Med. Inst., USSR). *Vopr. Onkol.* 20(9):57-61, 1974.

See also, 9365, 9372, 9420, 9596.

LIVER AND BILIARY TRACT

9387 PATHOLOGY AND MORPHOLOGY OF PRIMARY LIVER CANCER ASSOCIATED WITH OPISTHORCHIASIS. *(Rus.)* Glumov, V. Ia.; Kotrikov, V. V.; Tretiakov, N. A. (Semipalatinsk Med. Inst., USSR). *Vopr. Onkol.* 20(9):46-50, 1974.

Postmortem morphological studies of 19 males and 25 females with primary hepatic cancer revealed chronic opisthorchiasis invasion in 42 cases. Greater incidence of opisthorchiasis-associated cancer was observed in males aged 50 and females aged 60. Liver sections showed numerous pale-gray tumorous nodules. Bile ducts were irregularly swollen with evidence of cholangiectasis containing mucus, epithelial desquamatae, helminths and bile. In 7 cases hepatic cancer was associated with pronounced cirrhotic changes. Jaundice was observed in 14 cases. Histological examination revealed cholangiocellular adenocarcinoma in 35 cases which might be the result of a pathological regeneration of bile duct epithelium. In 9 cases hepatocellular cancer developed with cirrhosis and diffuse hepatic fibrosis.

9388 HEPATIC PORPHYRIAS: CYTOCHEMICAL AND ULTRASTRUCTURAL STUDIES OF LIVER IN ACUTE INTERMITTENT PORPHYRIA AND PORPHYRIA CUTANEA TARDA. *(E.)* Biempica, L; Kosower, N.; Ma, M. H.; Goldfischer, S. (Albert Einstein Coll. Med., Bronx, N.Y.). *Arch. Pathol.* 98(5):336-343, 1974.

Case reports are presented for 11 patients with hepatic porphyrias, 7 with porphyria cutanea tarda and 4 with acute intermittent porphyria. Needle biopsies of liver tissue were obtained in 10 patients, and in case 11 an autopsy was performed. Cytochemical and ultrastructural studies showed similar subcellular alterations in both porphyrias, but histologically the damage was more severe in patients with porphyria cutanea tarda. An overload of lipid and iron, unrelated to the severity of the histological lesions, is common to both porphyrias. The most frequent findings were altered mitochondrial forms and increased numbers of autophagic vacuoles. Lipofuscin bodies were electron dense, large and increased in number, and contained extensive areas of ferritin deposits. An iron overload probably plays an important role in hepatocyte damage.

9389 JAUNDICE IN PREGNANCY. A FOLLOW-UP STUDY OF WOMEN ORIGINALLY REPORTED BY L. THORLING. II. PRESENT HEALTH OF THE WOMEN. *(E.)* Fruhoff, A. K.; Hellstrom, K. (Dept. Med., Karolinska Inst., Stockholm, Sweden). *Acta Med. Scand.* 196(3):181-189, 1974.

In 1955, L. Thorling reported on 71 pregnant women with jaundice, due to cholestasis of pregnancy or infectious hepatitis. Of the original number, 6 women had died and 4 were unwilling to participate in the 1970 follow-up. Of the remaining 61 women (aged 40-60 yr), only 44 participated in the complete study which consisted of a standardized questionnaire, oral cholecystography (where desirable), plus physical and laboratory examinations. Eight women had a moderately abnormal BSP retention unaccounted for by known disease; 3 of these had had symptoms compatible with recurrent cholestasis of pregnancy. In general, all the women considered themselves to be in good health and there were few indications of liver disease. Three of the women who died had severe kidney disease and uremia, and 12 survivors had symptoms of pyelitis and/or nephrolithiasis, pointing to the possible association between jaundice of pregnancy and renal diseases.

9390 HEPATIC PARENCHYMA WEIGHT CHANGES IN THE PRESENCE OF PRIMARY AND SECONDARY TUMORS OF THE LIVER: A MORPHOMETRIC STUDY. *(E.)* Ludwig, J.; Elveback, L. R. (Mayo Clin., Rochester, Minn.). *Beitr. Pathol.* 153(3):280-288, 1974.

Morphometric studies were performed on tumorous livers of 50 patients (24 men and 23 women, aged 26-94 yr). The hepatic parenchyma of all but 6 (13%) of the adult livers weighed more than 1 kg. Of the tumor-bearing livers, 28% had parenchymal weights exceeding the estimated 95th percentile in non-tumor controls. Loss of hepatic parenchyma in tumor-bearing livers is seldom severe enough to cause hepatic failure (only in 2 of the 8 cases of hepatic failure did the liver weigh less then 1 kg.). The right lobe of the liver is definitely favored in the distribution of tumors within this organ.

9391 POSSIBLE ROLE OF THIOL GROUPS IN THE ABNORMAL KINETICS OF ALDOLASE IN HEREDITARY FRUCTOSE INTOLERANCE. *(E.)* Lemmonnier, F.; Gregori, C.; Schapira, F. (Inst. Mol. Pathol., Paris, France). *Biochem. Biophys. Res. Commun.* 61(1):306-312, 1974.

Liver aldolase from 6 children with hereditary fructose intolerance had an abnormal affinity for fructose-1-phosphate. The apparent K_m of the aldolase for fructose-1-phosphate was 15-20 mM compared with 3.0-5.0 mM in normal liver extracts. Extraction and incubation with β-mercaptoethanol (10 mM) lowered the apparent K_m of aldolase in livers of the children with inherited disease to about 3 mM or less. The apparent K_m of aldolase C from human brain was 15 mM and, like the apparent Km of normal liver aldolase, did not change with addition of β-mercaptoethanol. The results suggest that the primary defect of hereditary fructose intolerance involves, directly or indirectly, the thiol groups of aldolase b.

9392 X-RAY MICROANALYSIS OF HEPATIC THORIUM DEPOSITIONS. *(E.)* Terzakis, J. A.; Sommers, S. C.; Snyder, R. W.; Sabbath, M. (Lenox Hill Hosp., New York, N.Y.). *Arch. Pathol.* 98(4):241-242, 1974.

A 49-yr-old woman was admitted with elevated serum alkaline phosphatase and SGOT levels. Previous history revealed a right cerebrovascular accident at age 23 due to aneurysm. A liver biopsy revealed granular deposits in Kupffer cells and in histiocytes within a fibrotic area of a portal space. Transmission electron microscopy, histioautoradiography, and x-ray microanalysis confirmed that these deposits contained thorium or an isotope of thorium.

9393 MORPHOLOGICAL AND BIOCHEMICAL STUDIES ON LIVER BIOPSIES OF PARKINSONIAN PATIENTS TREATED WITH LEVODOPA AND DECARBOXYLASE INHIBITOR. *(E.)* Nevalainen, T.; Riekkinen, P.; Rinne, U. K.; Sonninen, V. (Dept. Neurol., Univ. Turku, Finland). *Acta Neurol. Scand.* 50(1):122-130, 1974.

Needle biopsy specimens were obtained from 10 patients with Parkinson's disease prior to and at 6 months or 1 yr after combined p.o. treatment with L-Dopa (800-1000 mg/day) and a decarboxylase inhibitor, N^1-(DL-seryl)-N^2-(2,3,4,-trihydroxybenzyl)-hydrazine (200-250 mg/day). Biopsies were examined by light and electron microscopy. Enzyme activities (alkaline and acid phosphatase, acid proteinase, glucose-6-phosphatase, leucine aminopeptidase, β-glucuronidase) were studied biochemically to determine possible sublethal inhibitor effect on cell injury. There were no constant histologic or ultrastructural findings, or changes in enzyme activities, which could be related to treatment with L-dopa and decarboxylase inhibitor. Mitochondria, endoplasmic reticulum, and areas of glycogen deposits appeared similar both before and during treatment. Frequency of cytoplasmic lipid droplets and amounts of lipofuscin pigment appeared unaffected by treatment. While acid and alkaline phosphatase values were significantly increased at 6 months, biopsies obtained at 1 yr showed no significant changes in enzyme activities. Combined treatment with L-dopa and decarboxylase inhibitor, at the dosage used, appears to be well tolerated and nontoxic during treatment periods of 6 months to 1 yr.

9394 THE DIAGNOSTIC SIGNIFICANCE OF SERUM ALPHA-FETOPROTEIN. *(E.)* Azzopardi, A. (Dept. Pathol., Roy. Univ., Valletta, Malta). *Tumori* 60(3):231-235, 1974.

Eight patients with suspected extrahepatic neoplasms were tested for serum α-fetoprotein. Seven were positive and 3 of these patients had confirmed hepatocellular carcinoma. A 4th patient had a liver biopsy which showed pleomorphic malignant cells consistent with hepatocellular carcinoma, but a metastatic adenocarcinoma could not be ruled out. The remaining 3 cases were a papilary cystadenocarcinoma of the ovary, a primary adenocarcinoma of the bronchus and a primary bile duct carcinoma. These last 3 cases had wide spread metastases with tumor deposits in the liver. The only case with undetectable serum α-fetoprotein proved to be a hepatocellular carcinoma arising in a cirrhotic liver. It is concluded that serum α-fetoprotein can be detected in a large number of patients with hepatocellular carcinoma, in primary cancers of the gastrointestinal tract and its embryonic outgrowths, as well as in multipotential germinal tumors. The occasional presence of serum α-fetoprotein found in hepatitis, cirrhosis and biliary atresia suggests that the fetoglobulin can also be produced by benign proliferation of liver cells.

9395 HEREDITARY HAEMORRHAGIC TELANGIECTASIA OF THE LIVER DEMONSTRATED ANGIOGRAPHICALLY. *(E.)* Thomas, M. L.; Carty, H. (St. Thomas Hosp. Med. Sch., London, England). *Acta Radiol.* [*Diagn.*] *(Stockh.)* 15(4):433-438, 1974.

A 41-yr-old woman with known hereditary hemorrhagic telangiectasia (Osler-Weber-Rendu syndrome) of lips and fingertips was admitted with hepatomegaly. On two previous admissions she had undergone cholecystectomy for calculi with vagotomy and pyloroplasty for chronic duodenal ulcer and laparotomy for obstructive jaundice caused by calculi in the common duct. Liver biopsies were obtained both times. The second specimen showed dilatation of the sublobular portal tracts and central veins producing areas of angiomatoid cystic venous dilatation typical of the telangiectatic lesions of Osler's disease. It was decided that the patient should have an angiographic study. Selective catheterization of the celiac axis and hepatic artery proved impossible. Instead, a flood aortic injection of 80 ml Conray 420 was made with the patient prone and a series of films of the hepatic region were taken with an AOT film changer. The examination showed an enormously dilated celiac axis with a diameter comparable to the aorta's. Extreme dilatation and tortuosity of the hepatic artery and its branches was also present, indicating a greatly increased blood supply to the liver. In the hepatographic phase the contrast medium was present in numerous diffuse scattered pools 1-2 cm in size. It is suggested that a differential diagnosis must exclude primary hepatoma, hepatoma arising in a cirrhotic liver, metastases and cavernous hemagioma, since all of these lesions show an increased vascularity.

9396 A LIGHT AND ELECTRON MICROSCOPIC STUDY OF THE LIVER IN CASE OF ERYTHROHEPATIC PROTOPORPHYRIA AND IN GRISEOFULVIN-INDUCED PORPHYRIA IN MICE. *(E.)* Matilla, A.; Molland, E. A. (London Hosp., England). *J. Clin. Pathol.* 27(9):698-709, 1974.

A 30-yr-old woman, who had been taking a birth control pill for 18 months, had a history of photosensitivity for 9 months. Laboratory investigations gave the following data: hemoglobin, 12.4 g/100 ml; erythrocyte sedimentation rate, 41 mm in the 1st hr; alkaline phosphatase, 16.0 King-Armstrong U/100 ml; SGOT 50 IU/100 ml; bilirubin, 0.8 mg/100 ml; BSP, 15% retention at 45 min. Red cell porphyrins and fecal porphyrins were well above normal. Biopsy of skin from the hand showed *p*-aminosalicylic-positive hyaline material around the papillary vessels. Twenty male mice weighing about 25 g at the beginning of the experiment were given griseofulvin in diet and sacrificed at intervals beginning at 24 hr and lasting for 5 wk. Animal livers and the patient's biopsy specimen were examined by light- and electron-microscopy. In both cases crystals were present in hepatocytes and in the bile secretory pathways. Spectroscopic studies confirmed that the crystals in the human and animal livers contain protoporphyrin. The morphological similarities between the animal and human livers suggest a primary hepatic lesion in each case, but do not provide information about the mechanisms leading to protoporphyrin accumulation. It is suggested that there may be cases within the group of erythrohepatic protoporphyrias where the principal lesion is in the liver. In the case reported here, the pill may have elevated the liver aminolevulinic acid synthetase level sufficiently to cause accumulation of protoporphyrin in a previously abnormal but compensated system.

9397 SERUM UROCANASE IN TOXICITY TESTING. *(E.)* Trip, J. A. J.; van Dam, J.; Eibergen, R.; Que, G. S. (no affil.). *Food Cosmet. Toxicol.* 12(4): 588-589, 1974.

The correlation between serum levels of urocanase (specific liver enzyme) and histologic findings in needle-biopsy specimens from 186 patients with liver disease or hepatic dysfunction was examined. Good agreement between both was present in 75% of the patients, but similar correlations were also established for SGOT and SGPT (not liver-specific enzymes). Since urocanase determination is fairly time-consuming and not clearly superior, it is not an appropriate choice for routine laboratory study of liver damage.

9398 PRIMARY CANCER OF THE LIVER. *(E.)* Wiggins, C.; McCune, F. (Meharry Med. Coll., Nashville, Tenn.). *JAMA* 66(6):482-483, 504, 1974.

9399 PRIMARY LIVER CELL CARCINOMA: ALCOHOL AND CHRONIC LIVER DISEASE. *(E.)* Fisher, R. L.; Scheuer, P. J.; Sherlock, S. (Roy. Free Hosp., London, England). *Gastroenterology* 67(4):791, 1974.

9400 HEPATIC ARTERY-PORTAL VEIN FISTULA WITH HEPATIC CIRRHOSIS, HEPATOMA AND BLEEDING ESOPHAGEAL VARICES. *(E.)* Kanda, L. T.; Mispireta, L. A.; Mock, J. P.; Absolon, K. B. (Washington Hosp. Ctr., Washington, D.C.). *Med. Ann. D.C.* 43(11):543-548, 1974.

9401 THREE CASES OF HEPATOMA. *(E.)* Harding, W. R. (Preston, Northcote Commun. Hosp., Australia). *Aust. Radiol.* 18(1):37-42, 1974.

9402 HEPATIC ARTERY LIGATION FOR CARDIAC FAILURE DUE TO HEPATIC HEMANGIOMA IN THE NEWBORN. *(E.)* Mattioli, L.; Lee, K. R.; Holder, T. M. (Univ. Kansas Med. Ctr., Kansas City). *J. Pediatr. Surg.* 9(6):859-862, 1974.

9403 CALCIFIED HEPATOBLASTOMA IN A NEWBORN. *(E.)* Cremin, B. J.; Nuss, D. (Red Cross Children's Hosp., Cape Town, South Africa). *J. Pediatr. Surg.* 9(6):913-916, 1974.

9404 A CASE OF ADENOMA OF THE LIVER IN AN INFANT. *(Dut.)* Iarchy, J.; Van Herreweghe, W. (Stuivenberg Gen. Hosp., Antwerp, Belgium). *Tijdschr. Geneeskd.* 29(19):939, 943-944, 1974.

9405 MULTIPLE FORMS OF CATALASE FROM NORMAL HUMAN LIVER, HEPATOMAS AND TUMOR-BEARING LIVERS. *(E.)* Koyama, S.; Hattori, N.; Okazaki, N.; Ohno, T.; Kanda, Y. (Natl. Cancer Ctr. Hosp., Tokyo, Japan). *Jap. J. Clin. Oncol.* 6(1):47-56, 1974.

9406 TREATMENT OF HEPATIC METASTASES OF CARCINOID TUMOURS USING ^{14}C-5-HYDROXY TRYPTOPHAN. *(E.)* Rampal, P.; Pierotti, T.; Murat, J.; Delmont, J. (Cimiez Hosp., Nice, France). *Digestion* 10(4-5):376, 1974.

9407 BENIGN LIVER TUMORS AND CYSTS IN CHILDHOOD. *(E.)* Ein, S. H.; Stephens, C. A. (Hosp. Sick Children, Toronto, Canada). *J. Pediatr. Surg.* 9(6):847-851, 1974.

9408 A CASE OF HYDATID CYST OF THE LIVER WITH DOUBLE GASTRIC AND BILIARY PERFORATION. *(It.)* Massaiolo, N.; Nano, M.; Fausone, G. (Inst. Special Surg. Pathol., Univ. Turin, Italy). *Chir. Gastroenterol.* 7(4):523-532, 1973.

9409 EXTRINSIC STENOSIS OF THE MEAN HEPATIC ARTERY DUE TO HYPERPLASIA OF NERVOUS FIBERS. *(Fr.)* Dreze, C.; Van de Berg, L.; Lombard, R.; Van de Berg, A. (no affil.). *Acta Gastroenterol. Belg.* 36(9):472-488, 1973.

9410 LIVER DISEASE IN PATIENTS WITH JOINT SYMPTOMS. *(E.)* Hilton, A. M.; Boyes, B. E.; Smith, P. J.; Sharp, J.; Dymock, I. W. (Univ. Hosp. South Manchester, England). *Digestion* 10(4-5):355-356, 1974.

9411 MELANOSIS COLI WITH LIVER INVOLVEMENT. *(E.)* Dubilier, L. D.; Burkhart, R. C. (Central Baptist Hosp., Lexington, Ky.). *Gastroenterology* 67(4):789, 1974.

9412 EXCHANGE TRANSFUSION FOR REYE'S SYNDROME. *(E.)* Lewis, J. D.; Varma, R. R.; Casper, J. T.; Harrington, G. J.; Darin, J. C. (Med. Coll. Wisconsin, Milwaukee). *Gastroenterology* 67(4):909, 1974.

9413 PREDNISONE FOR CHRONIC ACTIVE LIVER DISEASE (CALD): DOSE TITRATION, STANDARD DOSE, AND COMBINATION WITH AZATHIOPRINE COMPARED. *(E.)* Summerskill, W. H. J.; Korman, M. G.; Ammon, H. V.; Baggenstoss, A. H. (Mayo Med. Sch., Clin., Rochester, Minn.). *Gastroenterology* 67(4):830, 1974.

9414 ANTIPYRINE, LIDOCAINE, AND PARACETAMOL METABOLISM IN CHRONIC LIVER DISEASE. *(E.)* Finlayson, N. D. C.; Prescott, L. F.; Adjepon-Yamoah, K. K.; Forrest, J. A. H. (Roy. Infirm., Edinburgh, Scotland). *Gastroenterology* 67(4):790, 1974.

9415 α_1-ANTITRYPSIN DEFICIENCY IN LIVER DISEASE: THE EXTENT OF THE PROBLEM. *(E.)* Fisher, R. L.; Taylor, L.; Maze, M.; Sherlock, S. (Roy. Free Hosp., London, England). *Digestion* 10(4-5):320-321, 1974.

9416 ALPHA-1-ANTITRYPSIN DEFICIENCY IN LIVER DISEASE: THE EXTENT OF THE PROBLEM. *(E.)* Fisher, R. L.; Taylor, L.; Sherlock, S. (Roy. Free Hosp., London). *Gastroenterology* 67(4):792, 1974.

9417 ISOLATION OF α_1-ANTITRYPSIN FROM LIVER IN α_1-ANTITRYPSIN DEFICIENCY. *(E.)* Eriksson, S.; Larsson, C. (Malmo Gen. Hosp., Sweden). *Digestion* 10(4-5):347, 1974.

9418 LIVER BIOPSY DATA ON A CHILD WITH FRUCTOSE 1,6-DIPHOSPHATASE DEFICIENCY THAT CLOSELY RESEMBLED MANY ASPECTS OF GLUCOSE 6-PHOSPHATASE DEFICIENCY (VON GIERKE'S TYPE I GLYCOGEN-STORAGE DISEASE). *(E.)* Eagle, R. B.; MacNab, A. J.; Ryman, B. E.; Strang, L. B. (Charing Cross Hosp. Med. Sch., London, England). *Biochem. Soc. Trans.* 2(5):1118-1121, 1974.

9419 HEPATIC COMA AFTER MULTIPLE DENTAL EXTRACTIONS: REPORT OF A CASE. *(E.)* Mainous, E. G.; Boyne, P. J. (Naval Hosp., Long Beach, Calif.). *J. Oral Surg.* 32(9):682-684, 1974.

9420 HEPATIC COMA AND ACUTE PANCREATITIS. *(Pol.)* Bielawski, W.; Smoczynski, M. (Med. Acad. Gdansk, Poland). *Pol. Arch. Med. Wewn.* 50(11):1149-1154, 1973.

9421 ASSESSMENT OF SURVIVAL PROSPECTS IN ACUTE HEPATIC FAILURE BY A DETAILED COAGULATION SCREEN. *(E.)* Dymock, I. W.; Tucker, J. S.; Boyes, B. E.; Woolf, I. L.; Thomson, J. M.; Poller, L. (Univ. Hosp. South Manchester, England). *Digestion* 10(4-5):346, 1974.

9422 AN ARTIFICIAL LIVER SUPPORT SYSTEM FOR THE TREATMENT OF ACUTE HEPATIC FAILURE. *(E.)* Gazzard, B. G.; Weston, M. J.; Murray-Lyon, I. M.; Williams, R. (King's Coll. Hosp. Med. Sch., London, England). *Digestion* 10(4-5):320, 1974.

9423 HYPOPLASIA OF THE INTRAHEPATIC BILE DUCTS AND OTHER FORMS OF INTRAHEPATIC CHOLESTASIS IN INFANCY. *(Ger.)* Luders, D. (Pediatr. Clin., Univ. Gottingen, Germany). *Monatschr. Kinderheilk.* 122(5):207-216, 1974.

9424 THE PROGRESS OF CHILDREN WITH INTRAHEPATIC CHOLESTASIS. *(E.)* Heathcote, J.; Deodhar, K. P.; Scheuer, P. J.; Sherlock, S. (Roy. Free Hosp., London, England). *Digestion* 10(4-5):354-355, 1974.

9425 THE DIAGNOSTIC VALUE OF ROUTINE LIVER TESTS. *(E.)* Winkel, P.; Ramsoe, K.; Lyngbye, J.; Tygstrup, N. (Dept. Surg. C., Univ. Copenhagen, Denmark). *Digestion* 10(4-5):387-388, 1974.

9426 INTRODUCTION TO THE STUDY OF THE DISEASES OF THE LIVER AND BILE DUCTS. *(Fr.)* Julien, B. (Bichat Hosp., Paris, France). *Ouest Med.* 26 (4):399-415, 1973.

9427 IMMUNE PATHOLOGY AND THE LIVER. *(Fl.)* De Groote, J. (St. Rafael Gen. Hosp., Louvain, Belgium). *Tijdschr. Geneeskd.* 29(14):675-676, 1974.

9428 THE THERAPEUTIC ACTIVITY OF A LIVER EXTRACT ENRICHED IN VITAMIN B_{12}, THIAMINE, RIBOFLAVIN, AND NICOTINAMIDE. *(It.)* Ulivieri, P.; Marinai, F. (Leghorn Prov. Hosp., Livorno, Italy). *Gaz. Med. Ital.* 132(9):459-474, 1974.

9429 A CONTROLLED STUDY OF THE THERAPEUTIC PORTACAVAL SHUNT. *(E.)* Resnick, R. H.; Iber, F. L.; Ishihara, A. M.; Chalmers, T. C.; Zimmerman, H.; (Tufts Univ. Sch. Med., Boston, Mass.). *Gastroenterology* 67(5):843-857, 1974.

9430 PREDICTIVE VALUE OF BSP KINETICS FOR EARLY LIVER INVOLVMENT IN CYSTIC FIBROSIS (CF). *(E.)* Lebenthal, E.; Jacobson, M.; Kevy, S.; Shwachman, H.; Grade, R. (Harvard Med. Sch., Boston, Mass.). *Gastroenterology* 67(4):807, 1974.

9431 PATHOPHYSIOLOGICAL OBSERVATIONS IN FOUR HUMAN AUXILLARY LIVER ALLOGRAFTS. *(E.)* Fortner, J. G.; Shiu, M. H.; Kinne, D. W.; Kim, D. K.; Castro, E. B.; Yeh, S. D. J.; Benua, R. S.; Murphy, L. M.; Beattie, E. J. (Mem. Sloan-Kettering Cancer Ctr., New York, N.Y.). *Eur. Surg. Res.* 6(1): 33, 1974.

9432 NATURE AND ORIGIN OF THE PROTEINS OF BILE. I. A COMPARATIVE ANALYSIS OF SERUM AND BILE PROTEINS IN MAN. *(E.)* Dive, C.; Dermans, J. F. (Dept. Intern. Med., Catholic Univ. Louvain, Belgium). *Eur. J. Clin. Invest.* 4(4):235-239, 1974.

9433 SOME CRITERIA OF THE CARBOHYDRATE FUNCTION OF THE LIVER IN PREGNANT WOMEN WITH RHEUMATIC HEART DEFECT. *(Ukr.)* Kariuzlova, S. I. (Kiev Res. Inst. Pediatr. Obstet. Gynecol., USSR). *Pediatr. Akush. Ginekol.* 35(2):48-50, 1973.

See also, 9049, 9060, 9067, 9117, 9198, 9212, 9214, 9223, 9224, 9225, 9230, 9232, 9360, 9434, 9448, 9625, 9632, 9648, 9657, 9683, 9684, 9690.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

9434 HAEMOPERFUSION FOR JAUNDICE. *(E.)* Anonymous. *Br. Med. J.* 5929(3):486-487, 1974.

Bilirubin was removed *via* column hemoperfusion using a particle completely different from negatively charged resins. Albumin was bound to agarose beads by a technique for coupling proteins to insoluble polysaccharides and bilirubin was effectively removed from blood passed *in vitro* through a column of these beads without damage to either red cells or platelets. This new column is safe and removed only those substances which bind to albumin. The successful removal of unconjugated bilirubin from Gunn rats is of interest for children with an enzyme defect similar to that of the Gunn rat which lacks the hepatic microsomal enzyme to conjugate bilirubin with glucuronic acid before it is excreted as conjugated bilirubin into the bile. Children most severely affected develop irreversible brain damage or kernicterus in infancy from the very high blood levels of unconjugated bilirubin. Weekly hemoperfusion may sufficiently lower the blood bilirubin levels in these children. The more common clinical problem, the treatment of deep conjugated hyperbilirubinemia and persistent itching due, for example, to prolonged cholestasis from carcinoma of the biliary tree or primary biliary cirrhosis, may also be alleviated by such hemoperfusion. It is noted however that bile salts, which probably cause the itching, bind less firmly to albumin and would therefore not be so well removed by the agarose-bound albumin columns. The treatment of fulminant liver failure due to viral hepatitis or overdosage with paracetamol has employed column hemoperfusion with particles of charcoal coated with polyhema. It is not known which of the many substances that accumulate in blood during liver failure cause hepatic encephalopathy. It is suggested that 2 columns may be needed to fully reverse liver failure, one for removing water-soluble toxins and the other, such as a column of agarose-bound albumin, for protein bound compounds.

9435 THE INFLUENCE OF PHENOBARBITONE ON BILIRUBIN CLEARANCE. *(E.)* Heringova, A.; Jirsova, V. (Inst. Care Mother Child, Prague, Czechoslovakia). *Biol. Neonate* 23(5-6):325-329, 1973.

The effect of phenobarbital on bilirubin clearance was evaluated in 40 newborn infants with regard to the maturation process of the hepatic chromosecretoric function. Mothers of 10 infants born at term were given phenobarbital (100 mg/day p.o., 7-14 days before delivery). Ten premature infants were given phenobarbital (8 mg/kg/day in 3 divided doses p.o., from 6 hr to 4 days of life). A group of 10 full term and 10 premature infants served as controls. Initial serum bilirubin levels at 6 hr after birth were 2.6 mg/100 ml. On day 5 in control term infants and in control premature infants, the serum bilirubin levels were 6.0 ± 1.3 and 9.9 ± 0.6 mg/100 ml, resp. On day 1 of life, bilirubin clearance from the plasma was very slow for both term and premature infants in the control group; 37% and 45%, resp. of the injected pigment were still retained at 3 hr. In term infants born of mothers treated with phenobarbital, injected pigment was excreted within 2 hr. On day 5, control term infants excreted all injected bilirubin within 1 hr. In control premature infants, 40% of the administered bilirubin remained in circulation 3 hr after injection. Premature infants given phenobarbital since day 1 excreted all administered bilirubin within 80 min. No serious complications were encountered in infants receiving the drug or in those born to treated mothers. Activity reduction was the only sign noted in the treated premature infants. This study shows that phenobarbital given to mothers during pregnancy or to infants since day 1 enhances bilirubin clearance in newborns. It is suggested that when jaundice appears in term infants, the chromoexcretory capacity of their livers may be almost "normal" so that the beneficial effect of phenobarbital cannot be observed. Prophylactic administration of phenobarbital seems to be indicated in premature infants who may suffer from irreversible brain damage as a result of hyperbilirubinemia.

9436 CLINICAL AND GENETIC STUDIES ON DUBIN-JOHNSON SYNDROME IN A CLUSTER AREA IN JAPAN. *(E.)* Kondo, T.; Kuchiba, K.; Ohtsuka, Y.; Yanagisawa, W.; Shiomura, T.; Taminato, T. (Uwajima City Hosp., Ehime, Japan). *Jap. J. Hum. Genet.* 18(4):378-392, 1974.

Identification was made of 40 patients with definite and 8 with probable Dubin-Johnson syndrome in an isolated area in Japan. They belonged to 25 sibships in 22 families. The sex of the patient was not a significant factor. The majority of the families lived in the Tsushima-Minamiuwa district. Of the 3 families living outside this district, each had ancestors who had immigrated from Tsushima. All 22 families belonged to the peasant-fisher class. The estimated segregation ratio in sibs with normal parents was 0.218 ± .00219. Parental consanguinity among sibships with Dubin-Johnson syndrome was observed in 52%. The rate of consanguineous marriages in 415 married couples randomly selected in the cluster area was 12.3%. The mean BSP transport maximum (Tm) in 7 patients with the syndrome was virtually zero, but that in 11 normal controls and in 13 carriers was 7.2 and 5.2 mg/min, resp. The findings of a late increase in serum BSP and a decreased Tm with normal relative storage capacity of BSP are pathognomonic features of Dubin-Johnson syndrome. A black liver is suggestive, but the histologic finding of cytoplasmic granules alone is not pathognomonic. The data are consistent with an autosomal recessive mode of inheritance in Dubin-Johnson syndrome. Patients with the other types of constitutional nonhemolytic hyperbilirubinemia, including Rotor type, were not identified in these 22 families.

9437 ALTERATION OF DRUG METABOLISM IN GILBERT'S SYNDROME. *(E.)* Carulli, N.; Ponz de Leon, M.; Manenti, F.; Ferrai, A. (Inst. Clin. Med., Univ. Modena, Italy). *Digestion* 10(4-5):314, 1974.

9438 GILBERT'S FAMILIAL ACHOLURIC JAUNDICE. *(Sp.)* Rodriguez Cuartero, A.; Mora Lara, R. J.; Pelaez Redondo, J. (Dept. Med. Res., Univ. Granada, Spain). *Rev. Clin. Esp.* 129(6):579-583, 1973.

9439 THE INVOLVEMENT OF CYTOPLASMIC BSP BINDING PROTEINS IN GILBERT'S SYNDROME. *(E.)* Frezza, M.; Tribelli, C. (Inst. Pathol, Univ. Trieste, Italy). *Digestion* 10(4-5):314, 1974.

9440 THE FREQUENCY OF JAUNDICE IN NEONATAL BACTERIAL INFECTIONS. OBSERVATIONS ON 16 NEWBORNS WITHOUT HEMOLYTIC DISEASE. *(E.)* Escobedo, M. B.; Barton, L. L.; Marshall, R. E.; Zarkowsky, H. (St. Louis Children's Hosp., Mo.). *Clin. Pediatr.* 13(8):656-657, 1974.

9441 DEMONSTRATION OF A LIPOLYTIC ACTIVITY IN HUMAN MILK THAT INHIBITS THE GLUCURO-CONJUGATION OF BILIRUBIN. *(E.)* Luzeau, P.; Levillain, P.; Odievre, M.; Lemonnier, A. (Parrot Hosp., Bicetre, France). *Biomedicine* 21(6):258-261, 1974.

9442 HEPATIC BILIRUBIN-UDP-GLUCURONYLTRANSFERASE IN LIVER BIOPSIES OF PATIENTS WITH SICKLE CELL ANEMIA. *(E.)* Maddrey, W. C.; Boitnott, J. K.; Conley, C. L.; Odell, G. B. (Johns Hopkins Med. Inst., Baltimore, Md.). *Gastroenterology* 67(4):812, 1974.

9443 JAUNDICES CAUSED BY NON-CONJUGATED BILIRUBIN. *(Fr.)* Benhamou, J. P. (Beaujon Hosp., Clichy, France). *Acta Gastroenterol. Belg.* 36(9):427-437, 1973.

9444 CHLORPROMAZINE-INDUCED CHANGES IN BILIRUBIN METABOLISM: POSSIBLE CLUES TO CHOLESTATIC JAUNDICE. *(E.)* Knodell, R. G.; Bell, C. J.; Conrad, M. E. (Walter Reed Army Inst. Res., Washington, D.C.). *Gastroenterology* 67(4):803, 1974

9445 ROTOR'S SYNDROME: A DISTINCT INHERITABLE PATHOPHYSIOLOGIC ENTITY. *(E.)* Wolkoff, A. W.; Wolpert, E.; Pascasio, F.; Arias, I. M. (Albert Einstein Coll. Med., New York, N.Y.). *Gastroenterology* 67(4):838, 1974.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

9446 BLOOD LEVELS OF RIFAMPICIN IN LIVER DISEASES. *(E.)* Pozzi, E.; Menghini, P. (Fac. Med., Univ. Pavia, Italy). *Int. J. Clin. Pharmacol.* 10(1):44-49, 1974.

A group of 15 male tuberculous patients (34-56 yr of age), divided into subgroups of 10 patients with a BSP retention value greater than 7% at 45 min and 5 patients with normal liver functions, were administered rifampicin (600 mg in the morning and 300 mg 8 hr later), isoniazid (600 mg/day at 12 hr intervals), and ethambutol (1600 mg/day at 12 hr intervals). BSP and other liver function tests were performed during the trials along with rifampicin blood level measurements. Jaundice appeared in 8 patients in the 1st group within 5-7 days after drug administration began. None of the patients in group 2 showed any sign of jaundice. The jaundice regressed within 4-10 days after withdrawal of rifampicin. Rifampicin alone was administered at the same dosage on Tuesday and Friday for 2 weeks to 4 of the 8 patients previously showing jaundice, and no signs of jaundice appeared in this trial. Triple-drug therapy (twice a week) was thus resumed in these 4 patients. A good correlation was found between a 16% or more retention value for BSP (at 45 min) and the appearance of jaundice. Serum values of rifampicin were much higher in subjects with altered BSP excretion, including those patients resuming rifampicin in an intermittent regimen after discontinuation because of jaundice. Rifampicin appeared to be directly responsible for the jaundice and should be administered in lower doses to subjects with impaired liver function.

9447 DIPHENYLHYDANTOIN-INDUCED HEPATIC NECROSIS. *(E.)* Dhar, G. J.; Ahamed, P. N.; Pierach, C. A.; Howard, R. B. (Northwestern Hosp., Minneapolis, Minn.). *Postgrad. Med.* 56(1):128-134, 1974.

A case of diphenylhydantoin-induced hepatic necrosis in a previously healthy 20-yr-old woman is described. After taking the drug for 15 days as prescribed (100 mg p.o., 3 times a day), the patient presented with symptom complex of fever, rash, and generalized lymphadenopathy. Diphenylhydantoin was discontinued and phenobarbital was prescribed. Phenobarbital was discontinued after the patient revealed that she had been exposed to a neighbor with rubella. Marked improvement occurred during the next 5 days, and diphenylhydantoin was thus restarted. A recurrence of the symptoms occurred within 5 days; the patient now had extensive desquamating morbilliform rash covering the entire body, generalized lymph node enlargement, tachycardia, hepatomegaly of 4 fingerbreadths, jaundice, and a positive tourniquet test for capillary fragility. Total serum bilirubin was 3.8 mg/100 ml, alkaline phosphatase was 210, SGOT 118, and LDH 481 IU/ml. Treatment with prednisone was unsuccessful and the patient died in a state of profound toxemia with hemorrhagic manifestations rather than in hepatic failure even though the striking pathologic finding at post mortem was diffuse hepatic necrosis. Immediate withdrawal of diphenylhydantoin at the first sign of a possible adverse reaction appears mandatory in treating the condition which closely resembles rubella. Corticosteroids may or may not suppress the hypersensitivity phenomenon.

9448 STUDY OF THE EFFECT OF RIFAMPICIN ON THE LIVER. *(E.)* Laudano, O. M. (Centenario Hosp., Rosario, Argentina). *Tijdschr. Gastroenterol.* 16(41):283-294, 1973.

Rifampicin (600 mg/12 hr for 15 days) was administered to 15 subjects with normal liver function and 15 subjects with liver disease (average age for both groups 43 yr) to investigate the effect of the antibiotic on the liver. The subjects with liver disease consisted of 4 cases of fatty liver, 2 with liver metastases, 1 with active chronic hepatitis, and 8 with cirrhosis. Liver function tests (direct and indirect reacting serum bilirubin, alkaline phosphatase, SGOT, SGPT, and BSP retention at 45 min) were performed before treatment, on the 7th day, and at the end of treatment. All normal subjects showed normal liver function values and no other abnormalities; the same was true for 4 patients with fatty liver. The 2 patients with liver metastases became jaundiced on the 12th and 15th day of treatment, resp., with remission of the jaundice in 3-4 days after discontinuation of the drug. The jaundice was associated with an increase of the 2 bilirubin values only, and no evidence of cytolysis or cholestasis was apparent. Jaundice appeared on the 7th day and showed remission after 3 days in the patient with active chronic hepatitis who was also receiving prednisone (40 mg/day). Five of 8 patients with cirrhosis became icteric on the 3rd, 4th, 5th, 9th, and 10th day of treatment, resp. The remaining 3 cirrhotic patients showed serum bilirubin values at the upper limit of normal. In all cases jaundice remitted on the 3rd or 5th day, without increase in transaminases or alkaline phosphatase and without changes in the BSP clearance values. The elevated values of free and conjugated bilirubin associated with jaundice reached a high of 39.1 mg% (total serum bilirubin).

9449 ANGIOGRAPHY IN RADIATION "HEPATITIS". *(E.)*

Nebesar, R. A.; Tefft, M.; Vawter, G. F.; Filler, R. M. (Children's Hosp. Med. Ctr., Boston, Mass.). *Br. J. Radiol.* 47(561):588-593, 1974.

Selective celiac, hepatic, splenic, and superior mesenteric angiography was used to evaluate radiation hepatitis in 5 children (16 months to 6 yr of age). Each had been treated for Wilms' tumor and had received routine post-operative abdominal irradiation to the tumor bed. The angiograms were correlated with liver scans taken during routine follow-up and with biopsy results. The angiographic and pathologic findings correlated well. During the acute phase, when hepatic venule obstruction and lobular congestion were present, the angiogram showed enlargement of the affected region with stretching of the hepatic arteries and retrograde (hepatofugal) flow in intrahepatic portal vein branches. In the chronic recovery phase, there was a compensatory hypertrophy of non-irradiated areas with stretching of hepatic arteries and atrophy and fibrosis of the irradiated region which showed crowding and corkscrewing of the hepatic arteries with normal hepatopetal portal venous flow. By combining scanning and angiography, the correct diagnosis can often be suggested, thus avoiding re-exploration, especially during the chronic phase of radiation injury.

9450 HEPATOTOXICITY OF PAPAVERINE. HISTOLOGIC LESIONS. *(E.)*

Kiaer, H. W.; Olsen, S.; Ronnov-Jessen, V. (Commun. Hosp., Frederiksborg, Denmark). *Arch. Pathol.* 98(5):292-296, 1974.

Biochemical and liver biopsy findings are presented for 8 patients (6 women and 2 men, ages 58-90 yr) exhibiting liver injury during treatment with papaverine (80 mg p.o. 4 times/day for about 1 month in most cases). Alkaline phosphatase, SGPT, and SGOT liver function indices were elevated in all cases. Subjective complaints (oppression or pain in the epigastrium) and fever were experienced in 4 of the 8 patients. The most important biopsy findings for the group as a whole were: significant eosinophilia in the portal spaces, focal eosinophilia in the hepatic parenchyma, and diffuse proliferation of the Kupffer cells. The degree of eosinophilia varied among different patients on the same dosage of papaverine and was thus independent of dosage. Cholestasis was not present in any of the patients. One patient exhibited a normal hepatic structure. The lesions were reversible in 7 of the patients; 1 patient, a 90-yr-old woman, died of a fresh myocardial infarction 3 days after liver biopsy. Abnormal liver function regressed in 2 of the patients despite continued treatment with papaverine. The hepatotoxic action of papaverine appears to include an allergic factor.

9451 LONG-TERM FOLLOW-UP OF NEONATAL HEPATITIS: SAFETY AND VALUE OF SURGICAL EXPLORATION.

(E.) Lawson, E. E.; Boggs, J. D. (Children's Mem. Hosp., Chicago, Ill.). *Pediatrics* 53(5):650-655, 1974.

A retrospective analysis of the long-term course of either familial (5 cases) or sporadic (18 cases) neonatal hepatitis in 23 children was performed to evaluate the safety and value of surgical exploration for this condition. All 5 patients with familial disease and 9 with sporadic disease underwent diagnostic laparotomy and liver biopsy; surgery was not performed on the remaining 9 sporadic cases. More patients subjected to surgery died than patients in the nonsurgical group (4 deaths *versus* 1 death, resp.). Familial cases accounted for 2 of the 4 deaths among the group undergoing surgery. No statistically significant difference in outcome, however, appeared at long-term follow-up between the operative and nonoperative sporadic groups when familial cases were excluded from the total surgical group. Early laparotomy of infants with neonatal hepatitis who lack a positive family history is therefore considered safe and useful in establishing the diagnosis and in salvaging a small number of infants with surgically correctable biliary atresia.

9452 THE COMPLEXITIES OF PYRROLIZIDINE ALKALOID TOXICITY. *(E.)*

Cooper, P. (no affil.). *Food Cosmet. Toxicol.* 12(4):559-563, 1974.

Senecio species have been implicated in liver disease and primary liver tumors in developing countries where natural products are used for medicinal and cooking purposes. The alkaloids incriminated in these toxic effects include retrorsine, monocrotaline, fulvine, lasiocarpine, heliotrine, and senkirkine. All are esters of 1-hydroxymethyl-1,2-dehydropyrrolizidine and are probably metabolized by liver microsomal-enzyme systems to hepatoxic pyrroles. Prolonged administration of retrorsine (20 mg/kg p.o. through stomach tube) to vervet monkeys produced hepatic fibrosis and vaso-occlusive liver lesions. Pulmonary and myocardial changes were the principal findings in stumptail monkeys given monocrotaline (30 mg/kg s.c.) at age 1 month. Experiments in rats given monocrotaline (5-10 mg/kg i.v.) did not support the suggestion that 5-hydroxytryptamine in an effective intermediate in the pulmonary activity of the alkaloid. The overall toxicity of monocrotaline to rats depends on the level of hepatic microsomal activity. Prior treatment with phenobarbital resulted in earlier and more severe lung lesions and earlier death from 60 mg/kg monocrotaline. Chloramphenicol prevented death after this dose and ameliorated the acute lesions but did not prevent chronic liver lesions. Retrorsine and monocrotaline are more toxic to male rats than to females. Also, sensitivity of rats to lasiocarpine, heliotrine, and retrorsine increases with age, reflecting the capacity of the liver to produce and retain pyrroles. In contrast to the above-mentioned findings in young stumptail monkeys, monkeys given monocrotaline from 15 months on showed prominent ascites and increased portal venous pressure. Postmortem findings included granular livers with venous occlusion. These differences in organ sensitivity were attributed to differences in microsomal-enzyme levels and resulting differences in liver metabolite concentrations. Experiments in sheep provided no evidence that the effects of reduced methane production on the metabolism rate would afford protection for the target organs of pyrrolizidine metabolites.

9453 HEPATIC INJURY ASSOCIATED WITH NITROFURANTOIN THERAPY. *(E.)* Goldstein, L. I.; Ishak, K. G.; Burns, W. (DeWitt Army Hosp., Fort Belvoir, Va.). *Am. J. Dig. Dis.* 19(11):987-998, 1974.

Clinical and biochemical findings are reported for 2 patients (a 50-yr-old woman and a 44-yr-old man) who developed hepatic injury while taking nitrofurantoin for urinary tract infections. The female patient had been taking 400 mg/day p.o. nitrofurantoin for 5 weeks, while the male patient had taken a total dose of 60 g p.o. The major biochemical abnormality was elevation of serum transaminase values. SGOT and SGPT for the female were 250 and 100 U, resp. and for the male patient 120 and 65 U, resp. Readministration of nitrofurantoin (100 mg 4 times/day) to the male patient resulted in hypertransaminasemia (SGOT 250 U and SGPT 110 U). The light-microscopic and ultrastructural findings from hepatic biopsy specimens of both patients were those of a predominantly hepatocellular type of injury. The female patient exhibited scattered foci of intralobular necrosis and inflammation as well as sinusoidal acidophilic bodies. Electron microscopic examination revealed additional hepatocellular injury in the form of light cells and a relatively minimal degree of cholestasis. The other patient exhibited similar changes which were quantitatively more severe than those from the female's biopsy specimen. Comparison of these 2 cases with 6 other reported cases indicates that all patients but 1 were female and ranged between the ages of 31-65 yr. All patients had taken the drug p.o. The onset was usually sudden. There appears to be no relationship between dosage and the occurrence of the nitrofurantoin-associated illness.

9454 TALC GRANULOMATA IN LIVER DISEASE IN NARCOTIC ADDICTS. *(E.)* Min, K. W.; Gyorkey, F.; Cain, G. D. (VA Hosp., Houston, Tex.). *Arch. Pathol.* 98(5):331-335, 1974.

Liver biopsy results are presented for 16 male known drug users (ages 19-29 yr) with clinical hepatitis. The sera from 9 patients at the time of biopsy were positive for hepatitis-associated antigen (HAA). The microscopic changes were those of acute viral hepatitis in 7 patients; 8 patients had chronic aggressive hepatitis, and 1 had chronic persistent hepatitis. Additionally, there were prominent portal infiltrations which consisted of small lymphocytes, a few plasma cells, and rare granulocytes. There were also histiocytes with vacuolated foamy cytoplasm forming pseudogranulomata. These infiltrates were present throughout the hepatic lobules in 4 patients. The histiocytes examined under polarized light disclosed birefringent crystalline inclusions; these were needle-shaped, 5-12 μ long and morphologically consistent with talc granules. There were also occasional starch-containing histiocytes. The findings suggest that the filler substances in drugs (talc, for example) used i.v. may have an etiological role either singly or in combination with other factors (such as viruses) in chronic liver disease of drug users.

9455 THE INCIDENCE OF OXYPHENISATIN-INDUCED LIVER DAMAGE IN CHRONIC NON-ALCOHOLIC LIVER DISEASE. *(E.)* Dietrichson, O.; Juhl, E.; Nielson, J. O.; Oxlund, J. J.; Christoffersen, P. (Pathol. Inst., Copenhagen, Denmark). *Digestion* 10(4-5):344, 1974.

9456 BROMOBENZENE-INDUCED LIVER NECROSIS. PROTECTIVE ROLE OF GLUTATHIONE AND EVIDENCE FOR 3,4-BROMOBENZENE OXIDE AS THE HEPATOTOXIC METABOLITE. *(E.)* Jollow, D. J.; Mitchell, J. R.; Zampaglione, N.; Gillette, J. R. (Natl. Heart Lung Inst., Bethesda, Md.). *Pharmacology* 11(3):151-169, 1974.

9457 THE RELATIONSHIPS BETWEEN LIVER IRON CONCENTRATION, THE DURATION OF IRON-LOADING, AND THE SEVERITY OF LIVER DAMAGE IN IRON OVERLOAD IN MAN. *(E.)* Barry, M.; Risdon, R. A. (Roy. Free Hosp., London, England). *Digestion* 10(4-5):321, 1974.

9458 ACUTE LIVER DISEASE AFTER CUTANEOUS THERMAL INJURY. *(E.)* Czaja, A. J.; Smith, W. R. (USA Inst. Surg. Res, Fort Sam Houston, Tex.). *Gastroenterology* 67(4):787, 1974.

9459 LIVER DISEASE AFTER KIDNEY TRANSPLANTATION. *(E.)* Caralps, A.; Brulles, A.; Bacardi, R.; Andreu, J.; Masramon, J.; Llorens, J.; Guardia, J.; Martinez-Vazquez, J. M.; Gilvernet, J. M. (Fac. Med., Barcelona, Spain). *Digestion* 10(4-5):340-341, 1974.

9460 VINYL CHLORIDE AND CIRRHOSIS. *(E.)* Smith, P. M.; Williams, D. M. J. (Llandough Hosp., Penarth, Wales). *Digestion* 10(4-5):321-322, 1974.

9461 HEPATOTOXICITY AMONG POLYVINYL CHLORIDE (PVC) PRODUCTION WORKERS DURING FIRST YEAR SURVEILLANCE PROGRAM. *(E.)* Creech, J. L.; Makk, L.; Whelan, Jr., J. G.; Tamburro, C. H. (Univ. Louisville Sch. Med., Ky.). *Gastroenterology* 67(4):786, 1974.

9462 PERSISTENCE OF VINYL CHLORIDE (VD) INDUCED LIVER INJURY AFTER CESSATION OF EXPOSURE. *(E.)* Martin, J. F.; Waggoner, J. G.; Berk, P. D. (Natl. Inst. Arthritis Metab. Dig. Dis., Bethesda, Md.). *Gastroenterology* 67(4):814, 1974.

9463 DIABINASE INDUCED EOSINOPHILIC GRANULOMATOUS HEPATITIS AND MYELITIS. *(E.)* Espiritu, C. R.; Rigberg, L. A.; Robinson, M. J. (Mt. Sinai Med. Ctr., Miami Beach, Fla.) *Gastroenterology* 67 (4):790, 1974.

9464 GRANULOMATOUS HEPATITIS BY BCG INFECTION DURING IMMUNOTHERAPEUTIC TREATMENT OF A MALIGNANT MELANOMA. *(E.)* Serro, B.; Michael, H.; Dubois, J. B.; Serre, A. (St. Eloi Hosp., Montpellier, France). *Digestion* 10(4-5):380-381, 1974.

See also, 9066, 9485.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

9465 DANE COMPLEXES IN HEPATITIS B ANTIGEN. *(E.)* Moodie, J.; Stannard, L. M.; Kipps, A. (Med. Sch. Observatory, Cape Town, South Africa). *J. Gen. Virol.* 24(2):375-379, 1974.

Electron microscope observations of Dane complexes in hepatitis B antigen (HBAg)-positive sera are presented as evidence of an antigen-antibody system involving only the Dane coat material. Sera with large quantities of HBAg and numerous Dane particles, but with no detectable antibodies to surface antigens were subjected to agitation in chloroform for 5 sec or treatment with 0.01% mucasol overnight at room temperature and showed the formation of numerous and large complexes of Dane particles including 'tadpole' forms. The action on the lipoprotein of either chloroform or mucasol altered the surface structure of the Dane coats and the small spheres and tubules. Since the latter remained unaggregated the complexing of Dane particles appeared to be specific and significant. Treatment of a HBAg-immunoglobulin concentrate overnight with mucasol or with 0.25% deoxycholate resulted in aggregation into large complexes of damaged Dane particles, free cores, and free coats, with core antibody molecules attached to the exposed cores and linking some cores together. Incubation of the antigen-immunoglobulin concentrate for 1 hr at 37 C with 0.6 U/ml of protease, followed by deoxycholate treatment at 4 C overnight resulted in electron micrographs which differed from those obtained by exposure of the antigen to the bile salt alone. Small spheres and tubules were present in damaged form but not aggregated. Although Dane particles and particle coats were absent, there were large complexes of Dane particle cores linked together by anti-hepatitis B immunoglobulin similar to that previously shown for the immunoglobulin G of anti-HB_c on the core surface. These observations suggest the presence of a hidden Dane-coat antigen which is not present in the small spheres (20 nm) or in the tubules and which is destroyed by protease treatment.

9466 A SEROLOGICAL TOOL FOR THE DIAGNOSTICS OF VIRUS B HEPATITIS. *(E.)* Kjeldsberg, E.; Traavik, T.; Siebke, J. C. (Natl. Inst. Public Health, Oslo, Norway). *Acta Pathol. Microbiol. Scand.* [B] 82(3):396-402, 1974.

A new antigenic determinant (associated with the 27 nm core of the Dane particle) in virus B hepatitis was detected with the closed hexagon immunodiffusion test (a modified gel precipitation test). Hepatitis B antigen (HBAg)-positive serum of a chronic hepatitis patient treated with Tween 80 and with posthepatic sera negative for HBAb, had aggregates of 27 nm particles, some randomly distributed 20 nm particles, and some short disintegrating tubules. Tween 80 alone or with HBAg-negative serum produced no precipitation lines. Post hepatitis sera negative for HBAb, commercial human HB-antiserum and HBAb serum from a long-term carrier all produced precipitation lines when exposed to the detergent-treated serum (HBAg-positive and containing Dane particles) of a patient with chronic hepatitis. Precipitation lines were stronger with Tween 80 than without. It is assumed that the antigenic components of this new system are different from HBAg determinants as demonstrated in the modified gel precipitation test.

9467 PURIFICATION OF NAKED INTRANUCLEAR PARTICLES FROM HUMAN LIVER INFECTED BY HEPATITIS B VIRUS. *(E.)* Hirschman, S. Z.; Gerber, M.; Garfinkel, E. (Mt. Sinai Sch. Med., New York, N.Y.). *Proc. Natl. Acad. Sci. USA* 71(9):3345-3349, 1974.

Naked intranuclear particles from a human liver infected with hepatitis B virus were purified by a procedure that entailed isolation of the liver nuclei, the subsequent release of the naked intranuclear particles from the nuclei by sonication, and the purification of the particles on CsCl density gradients. The particles had a diameter of 27-28 nm, were hexagonal and showed the presence of capsomeres and spikes with lengths of 7-10 nm projecting from the surface. The particles formed cubic arrays with center-to-center distances of 40-42 nm. The overall particle symmetry was icosahedral. The UV absorption spectrum of the particles showed a peak at 264 nm with a shoulder at 280 nm. Endogenous DNA polymerase activity was present when activated DNA or d(A-T)n was used as exogenous template.

9468 C.E.A. IN 1974. *(E.)* Anonymous. *Br. Med. J.* 5929(3):484-485, 1974.

Among 192 patients who had undergone potentially curative surgery for colorectal cancer, serum carcinoembryonic antigen (CEA) titers rose progressivly in 6 asymptomatic patients in whom clinical examination revealed metastases. In 1 case, the CEA titer remained raised for 29 months before diagnosis was confirmed. In another series of 220 patients with apparently successful resections, progressive rises in CEA due to metastases occurred in 26 patients 8-18 months before confirmation of the diagnosis. Raised titers in 10 other patients were noted synchronously with clinical detection of tumor; a further 17 patients have a raised CEA but are asymtomatic and without clinical evidence of tumor. The increase in CEA was more marked for hepatic metastases than for nonhepatic metastases.

9469 A NEW HEPATITIS B ANTIGENIC DETERMINANT: RADIOIMMUNOASSAY STUDIES. *(E.)* Shorey, J.; Fitzgibbons, K. G. (Dallas VA Hosp., Tex.). *Gastroenterology* 67(4):829, 1974.

9470 HB-ANTIBODY, AN ADDITIONAL MARKER FOR THE PRESENCE OF HEPATITIS B VIRUS IN WHOLE BLOOD? *(E.)* Schlaak, M.; Lehmann, H.; Schober, A. (Med. Clin., Univ. Kiel, Germany). *Digestion* 10 (4-5):380, 1974.

9471 DEMONSTRATION OF HB-ANTIGENS IN LIVER TISSUE *(E.)* ten-Kate, F. J. W.; Feltkamp-Vroom T.; Helder, A. W.; Roos, C. M.; van Blankenstein, M. (Erasmus Univ. Rotterdam, Netherlands). *Digestion* 10(4-5):305, 1974.

9472 DNA PURIFIED FROM NAKED INTRANUCLEAR PARTICLES OF HUMAN LIVER INFECTED WITH HEPATITIS B VIRUS. *(E.)* Hirschman, S. Z.; Gerber, M.; Garfinkel, E. (Mt. Sinai Sch. Med., New York, N.Y.). *Nature (Lond.)*. 251(5475):540-542, 1974.

9473 HUMORAL IMMUNITY IN HEPATITIS B ANTIGEN (HBAg)-POSITIVE AND -NEGATIVE LIVER DISEASES. *(E.)* Gonzalez-Molina, A.; Rodrigo-Moreno, M.; Sarrion, J.; Berenguer, J.; Baguena, J.; Sanchez-Cuenca, J. M. (La Fe City Sanit. Soc. Security, Valencia, Spain). *Digestion* 10(4-5):351, 1974.

9474 CELL-MEDIATED IMMUNITY TO HEPATITIS B ANTIGEN IN BLOOD DONORS WITH PERSISTENT ANTIGENEMIA OR HIGH TITER ANTIBODY. *(E.)* Lee, W. M.; Reed, W. D.; Mitchell, C. G.; Eddleston, A. L. W. F.; Dymock, I.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 10(4-5):362, 1974.

9475 URINE ANTIGENS IN LIVER DISEASE UNRELATED TO THE HBAg SYSTEM. *(E.)* Gioustozi, A.; Merikas, G.; Economidou, J.; Hadziyannis, S. (Univ. Athens Med. Sch., Greece). *Digestion* 10(4-5):303-304, 1974.

9476 CHARACTERIZATION OF THE SERUM FACTORS(S) INHIBITING LYMPHOCYTE CYTOTOXITY IN VIRAL HEPATITIS. *(E.)* Mann, E. W.; Wands, J. R.; Alpert, E.; Isselbacher, K. J. (Massachusetts Gen. Hosp., Boston). *Gastroenterology* 67(4):813, 1974.

9477 DEMONSTRATION OF γ-GLOBULIN ON THE SURFACE OF ISOLATED HEPATOCYTES FROM PATIENTS WITH INFLAMMATORY LIVER DISEASE. *(E.)* Arnold, A.; Hopf, U.; Meyer zum Buschenfelde, K. H.; Bolte, J. P.; Forster, E. (2nd Dept. Intern. Med., Univ. Mainz, Germany). *Digestion* 10(4-5):334-335, 1974.

9478 FREE FATTY ACIDS IN VIRUS HEPATITIS. *(Pol.)* Maslowski, W.; Powiertowski, J.; Wekka, Z. (Milit. Med. Acad., Warsaw, Poland). *Pol. Arch. Med. Wewn.* 50(6):555, 560, 1973.

9479 GLUTAMINE DEHYDROGENASE LEVELS AFTER VIRUS HEPATITIS. *(Pol.)* Maslowski, W.; Czerniakowska, K. (Milit. Med. Acad., Warsaw, Poland). *Wiad. Lek.* 26(21):1977-1984, 1973.

9480 A STUDY ON HEPATIC ENZYME INDUCTION DURING HUMAN ACUTE VIRAL HEPATITIS. *(E.)* Carrella, M.; Budillon, G.; Mazzacca, G.; De Ritis, F. (Inst. Clin. Med., Univ. Naples, Italy). *Digestion* 10(4-5):341, 1974.

9481 TDL AND BDL IN PERIPHERAL BLOOD AND IN LIVER TISSUE IN ACUTE AND CHRONIC HEPATITIS. *(E.)* Sposito, M.; Aiuti, F.; Capocaccia, L.; Panichi, G.; Ciarla, M. V. (San Giacomo Hosp., Rome, Italy). *Digestion* 10(4-5):327-328, 1974.

9482 ALTERED METABOLISM OF ANTIPYRINE IN PATIENTS WITH ACUTE VIRAL HEPATITIS. *(E.)* Burnett, D. A.; Sorrell, M. F. (Univ. Nebraska Med. Ctr., Omaha). *Gastroenterology* 67(4):782, 1974.

9483 POST-TRANSFUSION HEPATITIS: A CHANGING SPECTRUM. *(E.)* Knodell, R. G.; Conrad, M. E.; Bell, C. J. (Walter Reed Army Inst. Res., Washington, D.C.). *Gastroenterology* 67(4):804, 1974.

9484 SUBACUTE HEPATIC NECROSIS: NATURAL HISTORY AND RESPONSE TO THERAPY. *(E.)* Lesesne, H. R.; Grisham, J. W.; Fallon, H. J. (Univ. North Carolina Sch. Med., Chapel Hill). *Gastroenterology* 67(4):809, 1974.

9485 α-FETOPROTEIN: EARLY FINDING OF LIVER REGENERATION IN ACUTE HEPATIC FAILURE. *(E.)* Naccarato, R.; Farini, R.; Gritti, G.; Chiaramonte, M.; Meani, A.; Sturniolo, G. C. (Inst. Pathol. Med., Univ. Padua, Italy). *Digestion* 10(4-5):371, 1974.

9486 THE PATHOGENESIS OF ARTHRITIS ASSOCIATED WITH ACUTE HB$_s$Ag-POSITIVE HEPATITIS: COMPLEMENT ACTIVATION AND CHARACTERIZATION OF CIRCULATING IMMUNE COMPLEXES. *(E.)* Wands, J. R.; Mann, E.; Alpert, E.; Isselbacher, K. J. (Massachusetts Gen. Hosp., Boston). *Gastroenterology* 67(4):834, 1974.

9487 THE CHOLESTATIC FORM OF VIRAL HEPATITIS. *(E.)* Burke, J. A. (Univ. Kentucky Coll. Med., Lexington). *Clin. Pediatr.* 13(8):636-639, 1974.

9488 HEPATITIS AND HERPESVIRUS. *(E.)* Anonymous (no affil.) *Br. Med. J.* 5929(3):484, 1974.

9489 AN OUTBREAK OF HEPATITIS B TRACED TO AN ORAL SURGEON. *(E.)* Rimland, D.; Parkin, W. E. (Pennsylvania Dept. of Health, Harrisburg). *Gastroenterology* 67(4):822, 1974.

9490 CHRONIC CARRIERS OF HEPATITIS B ANTIGEN (HBAg) IN MONTREAL VOLUNTARY BLOOD DONORS: INSTITUTIONALIZATION IN EARLY CHILDHOOD AS A MAJOR EPIDEMIOLOGICAL FACTOR. *(E.)* Richer, G.; Desrochers, M.; Guevin, R.; Turgeon, F.; Viallet, A. (St. Luc Hosp., Montreal, Canada). *Gastroenterology* 67(4):822, 1974.

9491 ROLE OF MOSQUITOES IN TRANSMISSION OF HEPATITIS B VIRUS INFECTION. *(E.)* Papaevangelou, G.; Kourea-Kremastinou, T. (Univ. Athens Med. Sch., Greece). *J. Infect. Dis.* 130(1):78-80, 1974.

9492 FATE OF INGESTED HEPATITIS B ANTIGEN (HBA$_g$) IN BLOOD-SUCKING INSECTS. *(E.)* Newkirk, M. M.; Downe, A. E. R.; Simon J. B. (Dept. Biol., Queen's Univ., Kingston, Canada). *Gastroenterology* 67(4):817, 1974.

9493 A CLINICAL STUDY OF ASYMPTOMATIC BRITISH BLOOD DONORS WITH POSITIVE TESTS FOR THE HEPATITIS B ANTIBODY. *(E.)* Woolf, I. L.; Boyes, B. E.; Tapp, E.; Jones, D. M.; Whittaker, J. S.; Renton, P. H.; Statton, F.; McSween, R. N.; Dymock, I. W. (Univ. Hosp. South Manchester, England). *Digestion* 10(4-5):330-331, 1974.

9494 CLUSTERING OF HEPATITIS B ANTIGEN IN RELATIVES OF PATIENTS WITH LIVER DISEASES AND HEPATITIS B ANTIGENEMIA. *(E.)* Bruguera, M.; Bosch, J.; Rodes, J.; Pedreira, J. D. (Prov. Clin. Hosp., Univ. Barcelona, Spain). *Digestion* 10(4-5):338, 1974.

9495 THE ROLE OF HEPATITIS B ANTIGEN CARRIERS IN NON-PARENTERAL TRANSMISSION OF THE HEPATITIS B VIRUS. *(E.)* Gateau, P.; Heathcote, J.; Sherlock, S. (Roy. Free Hosp., London, England). *Digestion* 10(4-5):349, 1974.

9496 BEHAVIOR OF SERUM LIPIDS IN CHILDREN WITH HEPATITIS A. *(E.)* Tamir, I.; Heldenberg, D.; Levtow, O.; Burstein, Y.; Lupo, S.; Werbin, B. (Univ. Tel-Aviv Med. Sch., Israel). *Clin. Chim. Acta* 56(1):113-120, 1974.

9497 STUDIES ON THE ASSOCIATION OF FAECAL ANTIGEN AND HEPATITIS A. *(E.)* Cross, G. F.; Peterson, D. A.; Deinhardt, F.; Holmes, A. W. (Rush-Presbyterian-St. Lukes Med. Ctr., Chicago, Ill.). *Gastroenterology* 67(4):787, 1974.

9498 INCIDENCE AND MEANING OF THE 'e' DETERMINANT AMONG AUSTRALIA ANTIGEN-POSITIVE PATIENTS WITH ACUTE AND CHRONIC LIVER DISEASES. *(E.)* Nielsen, J. O.; Dietrichson, O.; Juhl, E. (Blegdam Hosp., Copenhagen, Denmark). *Digestion* 10(4-5):304, 1974.

See also, 9231, 9389, 9425, 9454, 9505, 9509, 9511, 9545.

Chronic Hepatitis

9499 ASYMPTOMATIC HEPATITIS B ANTIGEN CARRIERS: A CLINICOPATHOLOGICAL STUDY. *(E.)*

Fainaru, M.; Levij, I. S. (Hadassah Univ. Hosp., Jerusalem, Israel). *Acta Hepatogastroenterol.* 21(3):186-191, 1974.

A follow-up study performed on 6 asymptomatic chronic hepatitis B antigen carriers with no previous history of hepatitis revealed abnormal liver function tests (increased SGOT, SGPT, serum iron, or vitamin B_{12}) in 4 and abnormal histological findings of minimal chronic persistent hepatitis in 3. Biopsies showed moderate or slight mononuclear cell infiltration of portal space and, in 2 cases, a group of swollen Kupffer cells intermingled with lymphocytes. An additional finding in 1 biopsy was slight pleomorphism of liver cells near central vein branches, with a few binucleated liver cells. Only 1 patient with abnormal liver histology had abnormal liver function tests. In the 2-yr follow-up no deterioration of liver function was found in any of the 6 cases. The results are in agreement with other reports claiming that the carrier state is associated with liver damage which may remain unchanged for 2 or more yr.

9500 INFUSION OF HEPATITIS B ANTIBODY IN ANTIGEN POSITIVE ACTIVE CHRONIC HEPATITIS. *(E.)*

Reed, W. D.; Eddleston, A. L. W. F.; Williams, R.; Zuckerman, A. J.; Peters, D. K.; Maycock, W. D'A. (King's Coll. Hosp., London, England). *Aust. NZ J. Med.* 4(3):301, 1974.

Infusion of high-titer antibody to hepatitis B antigen (HBAg) in 6 patients with antigen-positive active chronic hepatitis induced a fall in HBAg (complement fixation) titers only in patients with initially low titers. The effect was temporary. Apart from transient microscopic hematuria in 1 patient and slightly increased proteinuria in another, there was no evidence of systemic immune-complex disease. Ag/Ab complexes were demonstrated prior to infusion in 3 patients, as well as immediately after infusion in 4. Of 5 patients with serum complement (C3) conversion products detectable after infusion, 3 showed the products before treatment.

9501 HISTOENZYMOLOGIC ANALYSIS OF THE SPECIFIC LIVER CATHEPSINS WITH REFERENCE TO THE PATHOLOGY OF EPITHELIOCONNECTIVE RELATIONSHIP. *(E.)*

Gabrielescu, E.; Bordeianu, A. (Dr. V. Babes Inst. Pathol. Med. Genetics, Bucharest, Rumania). *Rom. Med. Rev.* 18(1):6-16, 1974.

Activity of proteolytic enzymes was studied in liver biopsies from patients with chronic liver disease and in livers of rats with chronic hepatitis induced by tannic acid. The histochemical reaction of cathepsin D coincided with the dystrophic area in liver with proteolipid dystrophy. In cases of autolytic or cytolytic reactions, cathepsin D activity was intense in the contact zone between proliferating mesenchyma and epithelium, corresponding to alterations in lysosomal permeability. In chronic evolutive diseases with an active mesenchyma, cathepsin D was predominant in Kuppfer cells and was increased in inflammatory infiltrate within the parenchyma. Tryptase was present in intralobular inflammatory infiltrate and tended toward intracystoplasmatic diffusion in zones of mesenchymal aggression. Chymase was present only in mast cells, while cathepsin C was active only in hepatic epithelia. Leucyl-β-naphthylamidase activity was intense in biliary canalicular walls, proliferating bile neoducts, and liver cells undergoing biliary dedifferentiation. Histoenzymologic localization of cellular protease activity makes it possible to locate the site of maximum aggression and to differentiate predominantly hepatocytic or predominantly mesenchymal forms of chronic hepatic disease.

9502 CHRONIC HEPATITIS AND INTERSTITIAL CELL INFLAMMATION. *(It.)*

Gallo, G. (Ital. Ctr. Gastroenterol., Rome, Italy). *Rassegna Clin. Sci.* 49(1):24-26, 1973.

Granulomatosis of the liver, resulting from infiltrations of lymphocytes or lymphocytes and monocytes, is considered to be a manifestation of various types of immune phenomena. These lesions can almost always be traced to infectious diseases, particularly chronic diseases. The most common is tuberculosis, followed by rheumatic heart disease and rheumatoid arthritis. Of 120 patients with cirrhosis, seen in a 3-yr period, tuberculosis or rheumatic heart disease were diagnosed in more than 60%, while less than 20% had viral infections. Lymphocytes may develop into plasma cells which have antibody function. Lymphocyte infiltration may regress either spontaneously or in response to antibiotic therapy. The monocytes in lymphocyte and monocyte infiltrates, can develop into fibroblasts which have the ability to produce collagen. On the basis of these infiltrations, it is proposed that chronic hepatitis be classified into 2 types: (1) chronic interstitial or lymphocytic with a benign course and (2) chronic granulomatous or lymphomonocytic with fibrosclerotic course.

9503 CHANGES IN SERUM GLYCOPROTEINS IN CHRONIC HEPATITIS. *(Sp.)*

Ortiz Leyba, C.; Sanchez Guijo, P.; Pachon Diaz, J.; Medina Redonda, F.; Rodriguez Pinero, J.; Nunez Castain, C.; Villar Ortiz, J. (Fac. Med., Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 44(1):45-52, 1974.

After separation by electrophoresis, serum glycoprotein fractions were determined on 8 fasting patients with chronic hepatitis (5 with the aggressive form and 3 with persistent ones) and 24 controls. All glycoprotein fractions studied were increased in patients with chronic hepatitis. This increase was more pronounced for fucose and osamines than for neutral sugars and sialic acid. No changes were observed in total protein levels. When patients with chronic aggressive hepatitis were considered separately, the increase in serum neutral sugars and sialic acid were not significant, but this is attributed to the small number of cases since mean values were the same as for the entire group of hepatitis patients. Among patients with chronic persistent hepatitis, only sialic acid levels were significantly increased. Determinations of serum glycoproteins in the perchloric acid-soluble fraction revealed that all fractions were decreased, but decreases were significant only for sialic acid and perchloric acid-soluble proteins (mucoproteins). The decrease in the mucoprotein fraction was less pronounced among patients with chronic persistent hepatitis. Changes in serum glycoprotein levels observed in chronic hepatitis are probably due to a combination of dysproteinemia and the impairment of carbohydrate synthesis in the liver.

9504 HEPATIC TOLERANCE OF AZATHIOPRINE IN IMMUNOSUPPRESSIVE THERAPY FOR CHRONIC ACTIVE LIVER DISEASE. *(Cz.)*

Nicolaescu, T.; Bittman, E.; Stoiculescu, P.; Bordeianu, A.; Cinotescu, L. (D. Danielopolu Inst. Normal Pathol. Physiol., Bucharest, Rumania). *Cesk. Gastroenterol. Vyz.* 28(1):24-30, 1974.

Administration of azathioprine (1-1.5 mg/kg/day) or azathioprine + prednisone to 40 patients with chronic liver disease, with and without cirrhosis, for 6-28 months and administration of azathioprine (2 mg/kg/day p.o. through a stomach tube) to 77 adult rats for 30 days after 1/3 hepatectomy caused no appreciable liver damage, either in the patients or rats. Double-blind tests, performed on the patients with liver disease, were evaluated by liver biopsies, taken every 3-6 months, and liver function tests, performed before, several times during, and after discontinuation of therapy. Hepatocyte dystrophy and piecemeal necrosis were less common among treated patients than among those given placebos. Hepatocyte synthesis, as measured by decreases in serum albumin and β-lipoprotein levels, was appreciably better in azathioprine-treated patients than in controls. Incorporation of ^{32}P into nucleic acids was reduced by 1/3 in treated patients, but no evidence of nucleic acid denaturation was found. Treatment increased hepatocyte protease and lipids, but no differences in hepatocyte proteins and nucleoproteins or in the rate of liver regeneration were found between treated patients and controls. Azathioprine had no effect on blood bilirubin levels, but there was a higher percentage of treated patients with improved BSP clearance than of treated patients with decreased BSP clearance. Treatment had no significant effect on SGOT or SGPT levels, either in patients or experimental animals. In azathioprine-treated rats, however, serum alkaline phosphatase levels were increased, as was acid phosphatase activity in the liver.

9505 IMMUNE REACTIONS TO HEPATITIS B ANTIGEN IN ACUTE AND CHRONIC HEPATITIS. *(E.)*

Warnatz, H. (Univ. Hosp. Erlangen-Nurnberg, Germany). *Acta Hepatogastroenterol.* 21(4):237-244, 1974.

Lymphocyte cultures from healthy controls and patients with liver disease were incubated with phytohemagglutinin. The response to phytohemagglutinin was impaired in lymphocytes of patients with virus A hepatitis but was normal in patients with virus B hepatitis. A stimulation index over 2 was observed in 2 of 15 patients with serum A hepatitis, 7 of 11 patients with virus B hepatitis, 1 of 3 HBAg-positive postvirus B hepatitis patients (6 months after acute disease), and 6 of 7 patients with HBAg-negative postvirus B hepatitis. Follow-up studies were done on 3 patients whose clinical symptoms of virus B hepatitis appeared 2-3 months after blood transfusions. Lymphocyte stimulation by HBAg correlated with the presence of HBAg detected in serum and the clinical course of the disease. Leukocyte migration was inhibited significantly only in virus B hepatitis. Lymphocytes from 12 controls and 6 patients with postvirus B hepatitis were not stimulated by allogenic antigenic preparations with the exception of soluble liver cell antigen. Liver cell antigens, the soluble fraction in particular, had a stimulatory effect on lymphocytes from several patients with active chronic hepatitis. Mitochondrial preparations stimulated DNA synthesis in 3 patients with circulating mitochondrial antibodies but did not induce increased DNA synthesis in active chronic hepatitis. The data are insufficient to support the hypothesis that chronic hepatitis is due to an inadequate immune reaction of the host to virus B infection.

9506 IMMUNOAGGRESSION AND IMMUNODEPRESSION IN CHRONIC HEPATITIS PHYSIOPATHOLOGY *(E.)*

Nicolaescu, T.; Stoiculescu, P.; Bittman, E.; Bordeianu, A.; Boros, I.; Moucha, R.; Jinga, V.; Gheorghe, N.; Metz, L.; Cinotescu, L.; Pintilescu, V. (D. Danielopolu Inst. Norm. Pathol. Physiol., Bucharest, Rumania). *Rev. Roum. Physiol.* 11(3): 239-252, 1974.

9507 CHRONIC ACTIVE LIVER DISEASE (CALD): THE RELATION BETWEEN THE HISTOLOGICAL PICTURE OF THE LIVER BIOPSY AND THE DURATION OF THE DISEASE WITHOUT ADEQUATE TREATMENT. *(E.)*

Votgen, A. J. M. (Munic. Hosp., Arnhem, Netherlands). *Digestion* 10(4-5):384, 1974.

9508 THE SPONTANEOUS LONG-TERM EVOLUTION OF CHRONIC AGGRESSIVE HEPATITIS. *(E.)* Knoblauch, M.; Ammann, R.; Clavadetscher, P.; Grob, P.; Schmid, M. (Univ. Hosp., Zurich, Switzerland). *Digestion* 10(4-5):360, 1974.

9509 SUBACUTE AND CHRONIC ACTIVE HEPATITIS COMPARED. *(E.)* Schalm, S. W.; Summerskill, W. H. J.; Korman, M. G.; Baggenstoss, A. H. (Mayo Clinic, Rochester, Minn.). *Gastroenterology* 67(4): 826, 1974.

9510 CHRONIC PERSISTENT HEPATITIS FOLLOWING HEPATITIS B INFECTION. *(E.)* Iwarson, S.; Norkrans, G. (Dept. Infect. Dis., Univ. Goteborg, Sweden). *Digestion* 10(4/5):357-385, 1974.

9511 HL-A SYSTEM AND CHRONIC HGAg-POSITIVE HEPATITIS IN CHILDREN. *(E.)* Barbanti, M.; Reali, G.; Tolentino, P. (Dept. Infect. Dis. Univ. Genoa, Italy). *Digestion* 10(4/5):336, 1974.

9512 EVALUATION OF CELLULAR IMMUNITY IN CHRONIC LIVER DISEASE DURING CORTICOSTEROID THERAPY. *(E.)* Salerno, F.; Del Ninno, E.; Fargion, S.; Cappellini, M. D.; Fiorelli, G.; Dioguardi, N. (Inst. Pathol. Med., Univ. Milan, Italy). *Digestion* 10(4-5):378-379, 1974.

9513 IMMUNITY TO THE HEPATITIS B ANTIGEN IN ACTIVE CHRONIC HEPATITIS. *(E.)* Lee, W. M.; Reed, W. D.; Mitchell, C. G.; Zuckerman, A. J.; Eddleston, A. L. W. F.; Williams, R. (Kings Coll. Hosp. Med. Sch., London, England). *Gastroenterology* 67(4):808, 1974.

9514 THE EFFECT OF LEVAMISOLE ON THE IMMUNOLOGIC RESPONSE OF HBAg-POSITIVE PATIENTS. *(E.)* De Cree, J.; Verhaegen, H.; De Cock, W.; Brugmans, J. (St. Bartholomeus Clin. Res. Unit, Antwerp, Belgium). *Digestion* 10(4-5):306, 1974.

9515 STUDIES ON INTERFERON RESPONSE BY LYMPHOCYTES FROM CHILDREN WITH CHRONIC HEPATITIS. *(E.)* Tolentino, P.; Dianzani, F.; Zucca, M. (Inst. Infect. Dis., Univ. Genoa, Italy). *Digestion* 10(4-5): 383, 1974.

9516 MECHANISMS OF LIVER INJURY IN CHRONIC ACTIVE HEPATITIS: DEMONSTRATION OF LYMPHOCYTE CYTOTOXICITY FOR ISOLATED HEPATOCYTES. *(E.)* Cochrane, M. A. G.; Thomson, A. D.; McFarlane, I. G.; Eddleston, A. L. W. F.; Williams, R. (King's Coll. Med. Sch., London, England). *Digestion* 10 (4-5):329, 1974.

9517 CHRONIC ACTIVE LIVER DISEASE (CALD): PROGNOSTIC VALUE OF THE DETERMINATION OF THE ENZYME ALKALINE PHOSPHATASE (AP). *(E.)* Vogten, A. J. M. (Munic. Hosp., Arnhem, Netherlands). *Digestion* 10(4-5):385, 1974.

9518 CLINICAL, BIOCHEMICAL AND HISTOLOGICAL FINDINGS IN 39 HBAg-POSITIVE CHRONIC AGGRESSIVE HEPATITIS. A FOLLOW-UP STUDY. *(E.)* Giusti, G.; Ruggiero, G.; Galanti, B.; Piccinino, F. (1st. Med. Sch., Univ. Naples, Italy). *Digestion* 10(4-5):350, 1974.

9519 CHRONIC ACTIVE LIVER DISEASES AND LYSOSOMES. *(E.)* Krustev, L. P.; Poljakova-Krusteva, O.; Kanniz, F. (Med. Academy, Sofia, Bulgaria). *Digestion* 10(4-5):362, 1974.

9520 ACTIVITIES OF UREA-CYCLE ENZYMES IN LIVER BIOPSIES OF PATIENTS WITH CHRONIC ACTIVE LIVER DISEASE. *(E.)* Maier, K. P.; Volk, B.; Talke, H.; Gerok, W. (Dept. Med., Univ. Freiburg, Germany). *Digestion* 10(4-5):366-367, 1974.

9521 HL-A ANTIGENS IN ACTIVE CHRONIC HEPATITIS AND PRIMARY BILIARY CIRRHOSIS *(E.)* Galbraith, R. M.; Eddleston, A. L. W. F.; Smith, M. G. M Williams, R.; McSween, R. N. M.; Watkinson, G.; Dick, H.; Kennedy, L. A.; Batchelor, J. R. (King's Coll. Hosp. Med. Sch., London, England). *Digestion* 10(4-5) 304-305, 1974.

9522 STATISTICAL ANALYSIS OF VARIOUS PARAMETERS OF ELIMINATION OF INDOCYANINE GREEN (ICG) IN CHRONIC HEPATITIS. *(Pol.)* Juszczyk, J.; Grala, B. (Inst. Intern. Med., Poznan, Poland). *Pol. Arch. Med. Wewn.* 50(12):279-287, 1973.

9523 CHRONIC ACTIVE LIVER DISEASE (CALD): PREVENTION OF A CIRRHOSIS BY THE TREATMENT WITH PREDNISONE AND AZATHIOPRINE. *(E.)* Vogten, A. J. M. (Munic. Hosp., Arnhem, Netherlands). *Digestion* 10(4-5):384-385, 1974.

See also, 9425, 9473, 9474, 9477, 9481, 9498, 9544, 9573, 9574.

Alcoholic Liver Disease

9524 REDUCTION IN CIRCULATING T LYMPHOCYTES IN ALCOHOLIC LIVER DISEASE. *(E.)* Bernstein, I. M.; Webster, K. H.; Williams, Jr., R. C.; Strickland, R. G. (Univ. New Mexico Sch. Med., Albuquerque). *Lancet* 2(7879):488-490, 1974.

Peripheral-blood T and B lymphocytes were measured in 49 patients (45 men and 4 women, aged 23-68 yr) with alcoholic liver disease and in 14 chronic alcoholics (26-62 yr old) without clinical evidence of liver disease. Fourteen patients without clinical evidence of liver disease and 7 with only fatty liver had normal proportions and numbers of circulating T cells. A significant reduction of T cells was observed in 42 patients with alcoholic hepatitis and/or cirrhosis, with the reductions being greatest in alcoholic hepatitis. B-cell proportions and numbers were not altered in alcoholic liver disease, though a significant and unexplained increase in B cells was noted in alcoholics without overt liver disease. The mean proportion of rosette-forming T cells in the group with alcoholic hepatitis was 37 ± 19% as compared to a control value of 65 ± 11%. The pronounced decrease in peripheral-blood T cells suggests that there is a basic impairment in cell-mediated immunity in alcoholic liver disease.

9525 EFFECTS OF ETHANOL ON LIVER MORPHOLOGY AND PANCREATIC FUNCTION IN CHRONIC ALCOHOLISM. *(E.)* Bordalo, O.; Batista, A.; Noronha, M.; Lamy, J.; Dreiling, D. A. (Santa Maria Hosp., Lisbon, Portugal). *Mt. Sinai J. Med. NY* 41(6):722-731, 1974.

9526 ESTRONE, ESTRADIOL, AND ESTRIOL IN PLASMA AND URINE OF PATIENTS WITH DIFFERENT TYPES OF ALCOHOLIC LIVER DISEASE. *(E.)* Pentikainen, P. J.; Pentikainen, L. A.; Azarnoff, D. L.; Dujovne, C. A. (Univ. Kansas Med. Ctr., Kansas City). *Gastroenterology* 67(4):819, 1974.

9527 HEPATIC COLLAGEN TURNOVER IN ALCOHOLIC LIVER DISEASE. *(E.)* Mezey, E.; Potter, J. J.; Maddrey, W. C. (Baltimore City Hosp., Md.). *Gastroenterology* 67(4):815, 1974.

9528 CELLULAR IMMUNE REACTIVITY TO LIVER TISSUE IN ALCOHOLIC HEPATITIS. *(E.)* Mihas, A. A.; Bull, D. M.; Davidson, C. S. (Boston City Hosp., Mass.). *Gastroenterology* 67(4):816, 1974.

9529 BLOOD ACETALDEHYDE LEVELS FOLLOWING ETHANOL ADMINISTRATION: DIFFERENCE BETWEEN ALCOHOLIC AND NON-ALCOHOLIC SUBJECTS. *(E.)* Korsten, M. A.; Matsuzaki, S.; Feinman, L.; Lieber, C. S. (Bronx VA Hosp., N.Y.). *Gastroenterology* 67(4):805, 1974.

9530 INFLUENCE OF INHALED CARBON DISULPHIDE ON ACETALDEHYDE PRODUCTION AND LIVER FUNCTION IN ALCOHOLIZED MAN. *(E.)* Freundt, K. J.; Lieberwirth, H. (Inst. Pharmacol. Toxicol., Univ. Wurzburg, Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 282 (Suppl.):R21, 1974.

9531 ROLE OF ALTERED LYMPHOCTE FUNCTION IN ALCOHOLIC LIVER DISEASE. *(E.)* Zetterman, R. K.; Chen, T.; Leevy, C. M. (New Jersey Med. Sch., Newark). *Gastroenterology* 67(4):837, 1974.

9532 REGULATION OF ALCOHOL OXIDATION IN MAN: INHIBITION BY PROLONGED FASTING AND STIMULATION BY PHENOBARBITAL TREATMENT OR CHRONIC ALCOHOL CONSUMPTION IS EQUALIZED BY FRUCTOSE INFUSION. *(E.)* Bode, J. C.; Bode, C.; Thiele, D. (Med. Univ. Clin., Marburg/Lahn, Germany). *Digestion* 10(4-5):319, 1974.

9533 TREATMENT OF ALCOHOLIC HEPATITIS WITH ENCEPHALOPATHY: COMPARISON OF PREDNISOLONE WITH CALORIC SUPPLEMENTS. *(E.)* Lesesne, H. R.; Bozymski, E.; Fallon, H. J. (Univ. North Carolina Sch. Med., Chapel Hill). *Gastroenterology* 67(4):808, 1974.

9534 ZIEVE'S SYNDROME. TWO CASES. *(Fr.)* Teres, J.; Bruguera, M.; Vivancos, J.; Pou, J. M.; Gassull, M. A. (Fac. Med., Univ. Barcelona, Spain). *Ouest Med.* 26(4):427-431, 1973.

9535 SEX HORMONES IN LIVER DISEASE. *(E.)* Mowat, N. A. G.; Clark, M. L.; Dawson, A. W.; Edwards, C. R. W.; Fisher, R. (St. Bartholomew's Hosp., London, England). *Digestion* 10(4-5):370-371, 1974.

See also, 9080, 9164, 9227, 9425, 9473, 9558, 9573.

Cirrhosis

9536 TRANSHEPATIC CATHETERIZATION AND OBLITERATION OF THE CORONARY VEIN IN PATIENTS WITH PORTAL HYPERTENSION AND ESOPHAGEAL VARICES. *(E.)* Lunderquist, A.; Vang, J. (Univ. Hosp., Lund, Sweden). *N. Eng. J. Med.* 291(13):646-649, 1974.

A transhepatic portographic method for the management of patients with portal hypertension and bleeding esophageal varices is described. The method consists of percutaneous transhepatic portal venipuncture and manipulation of a catheter *via* the portal vein into the coronary vein. The risk of bleeding from esophageal varices is reduced by injection of 30 ml of 50% glucose solution, followed by a few drops of thrombin. The purpose of this injection is to produce a thrombus in the coronary vein that can migrate upward and obliterate the esophageal varices. Portography is used throughout to facilitate the procedure and assess the results. Obliteration of the coronary vein by this method has been successful in 4 patients treated thus far. Case reports for 2 of them (64-yr-old woman and 68-yr-old man, both with varice bleeding) are described. Transhepatic portography of the female patient, previously diagnosed as having cirrhosis and scheduled for shunt surgery, revealed a relatively small liver with reversed flow through the inferior mesenteric vein and a wide coronary vein to esophageal varices. Successful obliteration was performed, and shunt surgery was not undertaken. Transhepatic portography of the male patient who presented with diarrhea and abdominal pain and subsequently became jaundiced revealed retrograde flow of the contrast medium through the inferior mesenteric vein and coronary vein. Selective catheterization of the coronary vein gave a good demonstration of the esophageal varices. When the esophageal varices had been obliterated, it was decided not to perform shunt surgery.

9537 CERVICAL LYMPH-VENOUS SHUNT IN EXPERIMENTAL ASCITES AND IN PATIENTS WITH HEPATIC CIRRHOSIS. *(E.)* Donini, I.; Bresadola, F. (Gen. Surg., Surg. Ther. Clin. Inst., Univ. Ferrara, Italy). *Lymphology* 7(2):105-108, 1974.

The thoracic duct-jugular venous junction was examined in 10 mongrel dogs (15-20 kg) with ascites after experimental constriction of the supradiaphragmatic inferior vena cava. There was an increased pressure gradient across the thoracic duct-jugular vein junction and an increased resistance to thoracic duct lymph flow. After the thoracic duct was anastomosed to the external jugular vein, vascular resistance fell accompanied by an increase in thoracic duct lymph flow and a fall in the lymph-venous pressure gradient. Ascites disappeared. Based on these experimental findings, the thoracic duct-jugular venous junction was revised in 15 patients with hepatic cirrhosis with massive ascites intractable to medical treatment. After the operation, ascites improved in 3 patients (23%) and completely disappeared in 10 (77%) over the following 3-21 months. Two patients died: one of pneumonia, 30 days postoperative, and the other of gastrointestinal hemorrhage, 7 days postoperative. These findings support the notion that narrowing at the thoracic duct-jugular venous junction represents a restriction to maximal lymph flow and thereby an important factor in the pathogenesis of ascites in hepatic cirrhosis. Revising the junction through reanastomosis of the thoracic duct to the jugular vein potentiates lymph flow and relieves ascites without adversely affecting liver cell function.

9538 THE METABOLIC BASIS OF PORTASYSTEMIC ENCEPHALOPATHY AND THE EFFECT OF SELECTIVE VS NONSELECTIVE SHUNTS. *(E.)* Warren, W. D.; Rudman, D.; Millikan, W.; Galambos, J. T.; Salam, A. T.; Smith, III, R. B. (Emory Univ. Sch. Med., Atlanta, Ga.). *Ann. Surg.* 180(4):573-579, 1974.

The effects of selective and nonselective portacaval shunt procedures on nitrogen metabolism were assessed in 37 patients by studying the maximal rate of urea snythesis, ammonium chloride sensitivity and the clinical development of portasystemic encephalopathy. Of these, 18 were evaluated both before and after surgery. All patients had normal renal function and no ascites. Selective shunting did not significantly alter the maximal rate of urea synthesis following challenge with casein hydrolysate p.o. or crystalline amino acids (i.v.) whereas patients with nonselective shunts showed an increased rate (40 ± 4.21 mg urea N/hr/kg weight) compared to preoperative values (24.7 ± 4.51). Nonselective shunt procedures, unlike selective shunts, also adversely affected ammonium chloride tolerance (0.14 ± 0.02 g/kg weight maximal tolerated preoperative dose *versus* 0.06 ± 0.01 postoperative dose). Of 9 patients randomized for nonselective shunt, 5 developed postoperative encephalopathy compared to 1 of 9 patients treated by selective shunt. Overall, 85% of patients with encephalopathy had maximal rates of urea snythesis < 30 mg urea N/hr/kg weight. These data indicate that the selective shunt is clearly superior to the nonselective shunt with respect to protein metabolism. It also appears that patients with a marked restriction of urea synthesis preoperatively may be at high risk for developing postoperative encephalopathy.

9539 EMERGENCY ENDOSCOPY AFTER GASTROINTESTINAL HAEMORRHAGE IN 50 PATIENTS WITH PORTAL HYPERTENSION. *(E.)* Waldram, R; Davis, M.; Nunnerley, H.; Williams, R. (King's Coll. Hosp. Med. Sch., London, England). *Br. Med. J.* 4(5936):94-96, 1974.

Emergency endoscopy was performed in 50 patients with portal hypertension within 24 hr of a major episode of hematemesis or melena in an attempt to identify the bleeding site. All patients had esophageal varices; 11 patients also had gastric varices. One or more sources of bleeding were identified in 42 of the patients. Esophageal varices were the sole source of bleeding in only 16 cases with an additional 3 patients having bleeding esophageal varices in addition to another bleeding site. Bleeding from gastric varices was present in 11 patients. Acute erosive lesions of the esophageal, gastric and duedenal mucosa were the source of bleeding in 11 cases. Only 5 patients were bleeding from erosive gastric lesions, a finding at variance with previous studies. Gastric mucosal bleeding was no more common in 23 patients with alcoholic cirrhosis than in the entire group. Bleeding sites could not be determined in 8 patients either because of excessive blood being retained or because more than 1 lesion was present without any one being the obvious site.

9540 PREDICTION OF MORTALITY IN CIRRHOSIS OF THE LIVER.

(E.) Lecompte, Y.; Metreau, J. M.; Sancho, H. S.; Bismuth, H. (Paul Brousse Hosp., Villejuif, France). *Surg. Gynecol. Obstet.* 139(4):529-530, 1974.

The short-term mortality rate (1 month) of 136 patients with cirrhosis who were treated in a medicosurgical intensive care unit was studied to determine the prognostic value of 4 factors: gastrointestinal bleeding, encephalopathy, renal insufficiency, and coagulopathy. Based on the findings, 3 groups could be distinguished: 1) those with 0 or 1 factor (7.2 ± 6% mortality rate); 2) those with 2 factors (56.5 ± 20% mortality); and 3) those with 3 or 4 factors (100% ± 8% mortality). The prognostic value of gastrointestinal bleeding was studied separately and it was found that patients with only hemorrhage had a lower mortality rate (7%) than that of any other single factor (20%) although the difference was not significant. The results indicated that the presence of hemorrhage, encephalopathy, renal failure or coagulopathy alone in cirrhotic patients does not imply early death with certainty if they are the only serious signs. However, in this series all patients who presented with 3 or 4 factors died within 1 month. These patients are thus at high risk and are therefore candidates for hepatic transplantation even though such a procedure carries a high mortality rate.

9541 CIRRHOSIS AND MALIGNANT HEPATOMA IN α_1-ANTITRYPSIN DEFICIENCY.

(E.) Eriksson, S.; Hagerstrand, I. (Malmo Gen. Hosp., Sweden). *Acta Med. Scand.* 195(6):451-458, 1974.

Clinical and laboratory findings in 9 adults with both severe α_1-antitrypsin deficiency (Pi^{ZZ}) and non-alcoholic cirrhosis are presented. All patients were aged 50 yr or older at the time of diagnosis of cirrhosis which was rapidly progressive, terminating in coma or bleeding. Most patients presented with portal hypertension and ascites. Of 8 patients who died during the study, 6 had primary liver carcinoma (hepatocellular in 4 and cholangiocellular in 2). Hepatoma was suspected prior to death in only 1 patient. Histologically, all livers showed cirrhosis with prominent nodular regeneration. Cholestasis was not prominent. All livers contained typical periodic-acid-Schiff-positive inclusion bodies which were never seen within hepatoma cells. Emphysema was documented in 7 of the 9 patients and was clinically unrecognized, however, in 4. All but 1 patient had low serum albumin and hyper-γ-globulinemia with an unusually high immunoglobulin M level. Hepatitis-associated antigen was not detected and serum auto-antibodies were not present. Ceruloplasmin was slightly increased in most patients and α_1-antitrypsin deficiency was a prominent feature. It is estimated that the risk of cirrhosis in adults with the Pi^{ZZ} phenotype is about 10% and its pathogenesis remains obscure.

9542 CHANGES IN THE MORPHOLOGY AND HISTOCHEMISTRY OF PRETERMINAL DIGITAL CIRCULATION IN CIRRHOSIS. I.

(It.) Cantoni, L.; Curri, S. B.; Andreuzzi, P.; Samarani, O. (Maggiore Ca Granda Hosp., Milan, Italy). *Minerva Med.* 65(38/39):2248-2260, 1974.

Biopsies were taken from the tip of the left ring finger of 42 men and women, aged 36-67 yr, with chronic liver disease which was developing into cirrhosis. Nonspecific changes were found in the intermediate segment of type II, group B arteriovenous anastomoses in Bucciante's system of classification. Perisegmentary proliferation of the connective tissue was observed. The most important finding was areas of fibrinoid necrosis in the ground substance, indicating that connective tissue takes part in cirrhosis. These findings substantiate Villa's view that an angiodystrophic factor present in connective tissue is largely responsible for liver damage in cirrhosis. These changes are not limited to the liver, but may account for dehydration and lack of elasticity of the skin in cirrhotic patients, as well as capillary angectasia.

9543 USE OF L-DOPA IN THE TREATMENT OF HEPATIC COMA: CONSIDERATIONS AND PERSONAL CONTRIBUTION.

(Sp.) Ossorio Castellanos, C.; Noguera Hernando, E.; Isasia Munoz, T.; Aboy Martin, A.; Seonae, J. (Gran Hosp. Estado, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 43(5):563-672, 1974.

Case reports are presented for 6 patients (4 men and 2 women, aged 39-61 yr) with long histories of cirrhosis who were hospitalized with hepatic coma (grades I-IV). L-Dopa was generally given in doses of 5 g/day p.o. through a stomach tube until the patient recovered consciousness; the dose was then reduced to 1.5-3 g/day for 2 days. Total doses amounted to 5-32 g over periods of 1-6 days. Other treatment consisted of glucose infusions (6 cases), blood (2), glucose and potassium infusions (6), metoclopramide (4), vitamin K (6), and enemas (6). Response to therapy was excellent in 2 cases, good in 2, fair in 1, and nil in 1. Patients generally recovered consciousness later than others reported in the literature. This is attributed to their poor general condition, the presence of other conditions (e.g. dehydration and hypokalemia) affecting the outcome in some cases, and the generally poor prognosis (terminal cirrhosis, previous episodes of obnubilation, esophageal varices). Side effects consisted of vomiting (4 cases) which responded to metoclopramide and a possible rebound effect on the 2nd day in 1 case. The only change L-dopa produced was stimulation of consciousness; blood ammonia levels did not decrease and no changes occurred in blood and urine pictures, prothrombin time, total serum protein and serum protein fractions, serum transaminase activities, and pH. Four patients died, of gastrointestinal bleeding (2 cases), acute pulmonary edema (1 case), and hepatorenal syndrome (1 case).

9544 SEGMENTAL AND LOBAR ATROPHY OF THE LIVER. *(E.)* Ham, J. M. (Prince Henry Hosp., Sydney, Australia). *Surg. Gynecol. Obstet.* 139(6):840-844, 1974.

Case reports for 9 patients (4 men and 5 women, aged 32-70 yr) with segmental or lobar atrophy of the liver illustrate the clinical, roentgenological, and operative diagnostic problems that can arise in such patients. Presumed causes of atrophy were vascular or biliary obstruction, hepatocellular damage, or a combination of these factors. Final diagnoses included sclerosing cholangitis, intrahepatic tumors, hydatid disease, alcoholic liver diseases, acute hepatic necrosis, and cirrhosis. In none of the 5 patients who had liver scans was the correct diagnosis made, and angiograms were correct in only 1 of 3 cases. Macroscopic features at operation were similar. The segment or lobe was well demarcated from other liver tissue, markedly shrunken, firm, and pink; the liver capsule was usually wrinkled. Microscopic features were also similar and included collapse of the reticulin framework, disappearance of hepatocytes, proliferation of small bile ducts, and fibrosis in portal tracts together with an acute inflammatory cell infiltrate. At operation, the most likely cause of atrophy can be decided from the appearance of the remainder of the liver. Biliary or vascular obstruction is probably present if the remainder is normal in appearance, whereas if the remainder is cirrhotic and the extrahepatic biliary system normal, postnecrotic cirrhosis can be suspected. Operative cholangiography, including roentgenograms of the intrahepatic ducts, may show or malignant stricture or to intrahepatic stones. If atrophy is due to benign or malignant stricture or to hydatid disease, resection of the atrophic segment or lobe, together with the causative lesion, may be indicated. Alternatively, relief of ductal obstruction may be achieved by anastomosis of the duct to a jejunal loop.

9545 METABOLIC CLEARANCE OF HEXOBARBITAL IN PATIENTS WITH ACUTE HEPATITIS AND CIRRHOSIS OF THE LIVER. *(E.)* Richter, E.; Breimer, D. D.; Zilly, W.; Keller, B.; Brachtel, D. (Dept. Intern. Med., Univ. Wurzburg, Germany). *Digestion* 10(4-5):377, 1974.

9546 STEROID HORMONE METABOLISM IN LIVER CIRRHOSIS. A GAS CHROMATOGRAPHIC STUDY. *(E.)* Mengoli, C.; Lechi, A.; Ros, A.; Covi, G.; Scuro, A. (Inst. Special Med. Pathol. II, Univ. Padua, Italy). *Digestion* 10(4-5):368-369, 1974.

9547 PROTEIN TOLERANCE IN LIVER INSUFFICIENCY. *(E.)* Horky, J.; Blahnikova, L.; Pechar, J. (Res. Ctr. Metab. Nutr., Prague, Czechoslovakia). *Digestion* 10(4-5):357, 1974.

9548 INTERFERENCE WITH SYMPATHETIC FUNCTION AND CATECHOLAMINE RESPONSIVENESS IN LIVER DISEASE. *(E.)* Lunzer, M. R.; Manghani, K.; Newman, S. P.; Ginsburg, J.; Sherlock, S. (Roy. Free Hosp., London, England). *Digestion* 10(4-5):354-359, 1974.

9549 CHANGES OF EEG-FREQUENCY AND INTRAPULMONARY VENOUS ADMIXTURE DURING A PROTEIN LOAD IN PATIENTS WITH AND WITHOUT CIRRHOSIS OF THE LIVER. *(E.)* Schomerus, H.; Buchta, I.; Arndt, H. (Univ. Med. Clin., Marburg/Lann, Germany). *Digestion* 10 (4-5):312, 1974.

9550 IMPAIRED CONVERSION OF ^{3}H CHOLESTEROL TO CHOLIC ACID IN PATIENTS WITH CIRRHOSIS. *(E.)* Schwartz, C. C.; Vlahcevic Z. R.; Almond, H. R.; Gregory, D. H.; Swell, L. (VA Hosp., Richmond, Va.). *Gastroenterology* 67(4):828, 1974.

9551 DECREASED ACUITY OF TASTE AND SMELL IN CIRRHOSIS. *(E.)* Burch, R. E.; Sackin, D. A.; Jetton, M. M.; Sullivan, J. F. (VA Hosp., Omaha, Nebraska). *Gastroenterology* 67(4):781, 1974.

9552 BILE ACID CONCENTRATIONS IN BYLER DISEASE. *(E.)* Banfield, W. J.; Thaler, M. M.; Alagille, D.; Admirand, W. H. (Univ. California, San Francisco). *Gastroenterology* 67(4):779, 1974.

9553 SODIUM EXCRETION AND INTRARENAL DISTRIBUTION OF BLOOD FLOW IN CIRRHOSIS. *(E.)* Wilkinson, S. P.; Clarke, M.; Arroyo, V.; Moodie, H.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 10(4-5):309-310, 1974.

9554 EXTRACTION OF I^{125} ALBUMIN MICROAGGREGATES FROM PORTAL BLOOD: ESTIMATION OF FUNCTIONAL PORTAL BLOOD FLOW IN CIRRHOTICS. *(E.)* Huet, P. M.; Marleau, D.; Lavoie, P.; Viallet, A. (St. Luc Hosp., Montreal, Canada). *Gastroenterology* 67(4):800, 1974.

9555 OESOPHAGEAL VARICES, HEPATIC SINUSOIDAL PRESSURE (HSP) AND SURVIVAL. *(E.)* Van Toorn, D. W.; Gips, C. H.; Kruizinga, K. (Univ. Hosp., Univ. Groningen, Netherlands). *Digestion* 10(4-5): 311, 1974.

9556 UPPER GASTROINTESTINAL HEMORRHAGE IN CIRRHOSIS. *(E.)* Franco, D.; Deporte, A.; Bismuth, H. (INSERM, Paul-Brousse Hosp., Villejuif, France). *Digestion* 10(4-5):348, 1974.

9557 A CONTROLLED TRIAL OF PORTACAVAL SHUNT IN CIRRHOTIC PATIENTS WITH DIGESTIVE HEMORRHAGE. *(E.)* Rueff, B.; Roche-Sicot, J.; Sicot, C.; Fouchard-Degos, F.; Degos, J. D.; Prandi, D.; Maillard, J. N.; Benhamou, J. P.; Fauvert, R. (INSERM, Beaujon Hosp., Clichy, France). *Digestion* 10(4-5): 310, 1974.

9558 ESTIMATES OF IMMUNOLOGIC AND FIBROBLAST ACTIVITY IN ALCOHOLIC HEPATITIS AND CIRRHOSIS. *(E.)* Galambos, J. T. (Emory Univ. Sch. Med., Atlanta, Ga.). *Gastroenterology* 67(4):793, 1974.

9559 SURVIVAL IN PATIENTS WITH POSTNECROTIC CIRRHOSIS AND LAENNEC'S CIRRHOSIS UNDERGOING PORTACAVAL SHUNT. *(E.)* Kanel, G. C.; Zawacki, J. K.; Callow, A. D.; Kaplan, M. M. (New Engl. Med. Ctr. Hosp., Boston, Massachussetts). *Gastroenterology* 67(4):801, 1974.

9560 LATE HISTOPATHOLOGICAL ASPECTS OF THE LIVER AFTER ARTERIALIZATION ASSOCIATED TO PORTACAVAL SHUNT. *(E.)* Barge, J.; Flamant, Y.; Prandi, D.; Maillard, J. N. (Louis Mourier Hosp., Colombes, France) *Eur. Sur. Res.* 6(Suppl. 1):7, 1974.

9561 DETERRANTS TO SUCCESS OF HEPATIC PORTICOENTEROSTOMY FOR BILIARY ATRESIA *(E.)* Lilly, J. R.; Altman, R. P.; Randolph, J. G. (Univ. Colorado Med. Ctr., Denver). *Gastroenterology* 67(4): 810, 1974.

9562 MODERN SURGICAL METHODS IN THE TREATMENT OF PORTAL HYPERTENSION IN CIRRHOTIC PATIENTS *(E.)* Maillard, J. N.; Flamant, Y.; Grange, D. (Louis Mourier Hosp., Colombes, France). *Eur. Sur. Res.* 6(Suppl. 1):1, 1974.

9563 HEMODYNAMIC EVALUATION OF PATIENTS WITH INTRAHEPATIC PORTAL HYPERTENSION: RELATIONSHIP BETWEEN RUPTURED VARICES VISUALIZED AT ENDOSCOPY AND THE PORTO-HEPATIC GRADIENT. *(E.)* Viallet, A.; Marleau, D.; Martin, F.; Farley, A.; Villeneuve, J. P.; Lavoie, P. (St. Luc Hosp., Montreal, Canada). *Gastroenterology* 67(4):832, 1974.

9564 NON-CIRRHOTIC IDIOPATHIC PORTAL HYPERTENSION (IPH): RADIOLOGICAL AND HEMODYNAMIC EVALUATION OF 4 CASES BY COMBINED HEPATIC AND UMBILICO-PORTAL CATHETERIZATION. *(E.)* Marleau, D.; Villeneuve, J. P.; Huet, P. M.; Cote, J.; Lafortune, M.; Legare, A.; Lavoie, P.; Viallet, A. (St. Luc Hosp., Montreal, Canada). *Gastroenterology* 67(4):813, 1974.

9565 TREATMENT BY LACTULOSE OF PORTAL-SYSTEMIC ENCEPHALOPATHY. *(E.)* Dobrilla, G.; Cavallini, G.; Valentini, M.; Vantini, I.; Angelini, G.; Scuro, L. A. (Inst. Special Med. Pathol., Univ. Padua, Italy). *Digestion* 10(4-5):345-346, 1974.

9566 LACTULOSE IN THE TREATMENT OF CHRONIC PORTALSYSTEMIC ENCEPHALOPATHY : A PROSPECTIVE DOUBLE-BLIND, COOPERATIVE COMPARISON OF LACTULOSE WITH NEOMYCIN. *(E.)* Conn, H. O.; Leevy, C. M.; Maddrey, W. C.; Rodgers, J. B.; Seeff, L.; Vlachevic, Z. R. (VA Hosp., West Haven, Conn.). *Gastroenterology* 67(4):784, 1974.

9567 BILE ACID POOLS IN PRIMARY BILIARY CIRRHOSIS. *(E.)* Williams, C. N.; Macdonald, I. A.; Park-Dincsoy, H. (Dept. Med., Dalhousie Univ., Halifax, Canada). *Gastroenterology* 67(4):836, 1974.

9568 A TRIAL OF AZATHIOPRINE IN PRIMARY BILIARY CIRRHOSIS. *(E.)* Ross, A.; Heathcote, J.; Sherlock, S. (Roy. Free Hosp., London, England). *Gastroenterology* 67(4):824, 1974.

9569 SENSITISATION TO HUMAN BILE PROTEINS IN PRIMARY BILIARY CIRRHOSIS AND ACTIVE CHRONIC HEPATITIS: DEMONSTRATION OF ANTIGENIC MATERIAL IN BILE DUCT EPITHELIAL CELLS. *(E.)* Tsantoulas, D. C.; McFarlane, I. G.; Portmann, B.; Eddleston, A. L. W. F.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 10(4-5):305-306, 1974.

9570 T AND B LYMPHOCYTES IN PRIMARY BILIARY CIRRHOSIS. *(E.)* Colombo, M.; Vernace, S. J.; Paronetto, F. (Mt. Sinai Sch. Med., New York, N.Y.). *Gastroenterology* 67(4):783, 1974.

9571 HYPERCATABOLISM OF THE THIRD COMPONENT IN PRIMARY BILIARY CIRRHOSIS. *(E.)* Potter, B. J.; Elias, E.; Jones, E. A. (Roy. Free Hosp., London, England). *Digestion* 10(4-5):303, 1974.

9572 VITAMIN D THERAPY AND 25 HYDROXY VITAMIN D LEVELS IN PRIMARY BILIARY CIRRHOSIS. *(E.)* Ajdukiewicz, A. J.; Hamlyn, A. N.; Preece, M. A.; Ribot, C. A.; O'Riordan, J. L. H., Sherlock, S. (Roy. Free Hosp., London, England). *Digestion* 10(4-5):332-333, 1974.

9573 VIRAL AND BACTERIAL ANTIBODIES IN PRIMARY BILIARY CIRRHOSIS AND OTHER CHRONIC LIVER DISEASES. *(E.)* Thomas, H. C.; Holden, R.; Ironside, J.; Sommerville, R. G. (Western Infirm., Glasgow, Scotland). *Digestion* 10(4-5):383, 1974.

9574 ANTIBODIES TO SOME MICROBIAL AND NON-MICROBIAL ANTIGENS IN LIVER DISEASES. *(E.)* Petera, V.; Zavazal, V.; Vosmik, J. (Univ. Hosp., Plzen, Czechoslovakia). *Digestion* 10(4-5):373-374, 1974.

9575 HEPATIC MORPHOLOGY, IMMUNOGLOBULINS AND ANTIBODIES TO E. coli IN CIRRHOSIS. *(E.)* Prytz, H.; Bjorneboe, M.; Poulsen, H.; Christoffersen, P.; Orskov, F. (Bispebjerg Hosp., Copenhagen, Denmark). *Digestion* 10(4-5):375, 1974.

9576 GLOMERULAR IMMUNOGLOBULIN DEPOSITS IN CIRRHOSIS. *(E.)* Callard, P.; Druet, P.; Feldmann, G.; Prandi, D.; Rueff, B.; Weiss, Y.; Bariety, J.; Benhamou, J. P. (INSERM, Broussais Hosp., Paris, France). *Digestion* 10(4-5):309, 1974.

See also, 9062, 9228, 9229, 9419, 9460, 9473, 9504, 9506, 9507, 9512, 9519, 9521, 9523, 9535, 9616.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

9577 EFFECT OF GLYCEROPHOSPHATE ON LITHOGENIC BILE. A NEW APPROACH TO TREATMENT OF CHOLELITHIASIS. *(E.)* Linscheer, W. G.; Raheja, K. L. (VA Hosp., Syracuse, N.Y.). *Lancet* 2(7880):551-553, 1974.

The effect of short-term p.o. administration of β-glycerophosphate on the bile composition of 10 patients (3 female and 7 male, aged 44-64 yr) with lithogenic bile was studied. Nine of the patients had gallstones. Previous studies in animals showed a twofold increase of bile-phospholipids when glycerophosphate, a precursor of phospholipids, was incorporated in the diet. Fasting hepatic and gallbladder bile before and after treatment with the β-glycerophosphate (6 g p.o./day for 6 days) was analyzed for molar ratios of cholesterol, total bile salts, and total phospholipids. Duodenal intubation was performed following an overnight fast using a special tube with a steerable tip. Two hepatic bile samples were collected by hydrostatic pressure, and gallbladder emptying was accomplished by injection of 50% magnesium sulfate solution (40 ml) through the distal lumen. Two samples of gallbladder bile were then collected through the proximal lumen. β-Glycerophosphate treatment resulted in a lowering of the molar ratios of cholesterol to total bile salts and total phospholipids in 9 of 10 patients. This observation was confirmed by plotting the molar percentages on triangular coordinates. Cholesterol concentrations did not appear to change, though increases in phospholipid and bile salt concentrations were observed. The composition of the gallbladder bile did not change. An evaluation of β-glycerophosphate as a potential new therapeutic agent for dissolution of cholesterol gallstones in man appears indicated.

9578 EXTRAHEPATIC BILIARY ATRESIA. THE FREQUENCY OF POTENTIALLY OPERABLE CASES. *(E.* Danks, D. M.; Campbell, P. E.; Clarke, A. M.; Jones, P. G.; Solomon, J. R. (Roy. Children's Hosp., Melbourne, Australia). *Am. J. Dis. Child.* 128(5):684-686, 1974.

The frequency of potentially operable cases of extrahepatic biliary atresia is illustrated in an analysis of 50 patients (ages 3 days to 5 months) seen over an 18-yr period, 24 of whom were found to be potentially operable. Six of 17 patients in whom no patent ducts were found and on whom blind anastomosis was not performed eventually proved to have potentially operable lesions. Two of these patients showed postoperative bile drainage from the drain tube along with a clearing of jaundice; 1 is still alive at 6.5 yr, though she has biliary cirrhosis. The remaining 15 patients drained no bile after operation and subsequently died of liver failure. Patent bile ducts were demonstrated proximal to an atresic segment in 4 patients (3 females and 1 male) who underwent anastomosis. Two of the patients died of chronic cholangitis postoperatively, while 1 (the male) appears to have been cured (normal liver biopsy at 2 yr of age). The other patient (female) is alive and clinically well at the age of 7.5 yr, although she has biliary cirrhosis. Among 8 patients in the series on whom blind portoenterostomy was performed (Roux-en-Y technique in 2 cases and cutaneous bile enterostomy using an isolated segment of small bowel in 6 cases), bile flow sufficient to clear the jaundice occurred in 6. In a 7th patient, 90 ml of bile drained each day, but the jaundice had not completely cleared. Each of the 7 suffered several attacks of cholangitis, although 3 of these babies are currently progressing such that cure seems possible. An 8th patient drained no bile and died at 4 months of age. The findings to date indicate that 40-50% of all babies with extrahepatic bile duct obstruction must be regarded as having potentially operable lesions.

9579 SCLEROSING CHOLANGITIS AND ULCERATIVE COLITIS: AN INTERESTING CHOLANGIOTOMOGRAPHIC SIGN. *(E.)* Bunao, R. M.; Thomas, J. M.; Weaver, D. R.; Littleton, J. T. (no affil.). *Guthrie Bull.* 44(2):83-91, 1974.

An intravenous cholangiotomogram, together with other clinical and laboratory findings, was used to make a preoperative differential diagnosis of pericholangitis and sclerosing cholangitis, confirmed at laparotomy, in a 33-yr-old man with ulcerative colitis and an associated hepatobiliary complication resulting in secondary biliary cirrhosis. The patient presented with a 2 month history of painless, pruritic jaundice and a 15 yr history of colitis. Rectal biopsy confirmed sigmoidoscopic findings of chronic ulcerative colitis, and a percutaneous liver biopsy showed histologic features of subacute hepatitis. An intravenous cholangiotomogram done at a bilirubin level of 3.5 mg% showed a faint visualization of the intrahepatic and common bile ducts with non-visualization of the gallbladder, interpreted as representing periductal edema of pericholangitis and/or sclerosing cholangitis. Laparotomy, performed because of increasing icterus (total bilirubin of 13 mg% with a direct reading fraction of 6 mg%) and persistent serum alkaline phosphatase elevation (400 U/dl), confirmed the diagnosis. After undergoing an uneventful cholecystoduodenostomy and choledochostomy, the patient suffered a massive gastrointestinal hemorrhage 1.5 yr later and died in hepatic coma. Autopsy findings showed macronodular cirrhosis consistent with the biliary type and associated with acute pancreatitis, quiescent chronic ulcerative colitis, biliary nephrosis, splenomegaly, esophageal varices, ascites, anasarca, and gastrointestinal hemorrhage. The radiolucent halo observed along the margins of the opacified segments of the intrahepatic and common bile ducts during the preoperative intravenous cholangiotomogram appears to merit further corroboration as a roentgenological indication of pericholangitis or sclerosing cholangitis.

9580 BILIARY ATRESIA: NEW CONCEPTS OF PATHOLOGY, DIAGNOSIS, AND MANAGEMENT. *(E.)* Bill, A. H.; Brennom, W. S.; Huseby, T. L. (Childrens Orthopedic Hosp. Med. Ctr., Seattle, Wash.). *Arch. Surg.* 109(3):367-369, 1974.

A Japanese surgical technique (Kasai operation) for correcting biliary atresia in infants with no patent extrahepatic ducts is described. Assuming that a proximal duct suitable for anastomosis to the small bowel is not present, mounds of tissue (just anterior to the portal vein where the extrahepatic ducts ordinarily emerge from the liver) which contain the fibrosed remnants of the extrahepatic ducts are dissected off within a 1-cm diameter area (2 or 3 mm into the liver). Bleeding from the liver is controlled by pressure (never by cautery). A small bowel anastomosis is then made around the periphery of this raw area to the liver capsule and to the anterior wall of the portal vein posteriorly. A double Roux-en-Y anastomosis that includes an external vent is performed since a simple Roux-en-Y anastomosis does not prevent ascending cholangitis. Of 116 Japanese cases operated on before 3 months of age, 42% were found without jaundice 1 year or more after surgery. Observations of 8 primary anastomoses of the same type in the United States for patients under 3 months of age indicate 4 cases without jaundice over a year after surgery. Bile flow was demonstrated in 3 of 4 less than a year postoperatively. The livers in all the cases are still enlarged and show other signs of cirrhosis, though Japanese experience suggests that these livers will continue to improve. The patient should be operated on before 3 months of age. If the ducts are less than 200 μ in diameter, adequate excretion of bile is unlikely. The occurrence of ascending cholangitis after bile flow establishment must be guarded against by the immediate use of antibiotics when unexplained fever appears.

9581 EPIDURAL ANALGESIA FOLLOWING CHOLECYSTECTOMY. *(E.)* Addison, N. V.; Brear, F. A.; Budd, K.; Whittaker, M. (Roy. Infirm., Bradford, England). *Br. J. Surg.* 61(10):850-852, 1974.

The postoperative analgesic effectiveness of epidural bupivacaine (Marcain) versus i.m. pethidine administration was assessed in 50 patients (1:3 male to female ratio) undergoing cholecystectomy. One group of 25 received 6 ml of bupivacaine postoperatively (*via* epidural catheter) followed by an additional 6 ml when pain was reexperienced, while the other group of 25 received a weight-related dose (i.m.) of pethidine postoperatively. Postoperative pain was assessed with the visual linear analogue method. Adequate analgesia was produced in 20% more patients receiving epidural analgesia than those receiving i.m. pethidine. Incidence of postoperative pulmonary infection in the epidural group was 4% as compared to a 20% incidence in the pethidine group. Complications considered to be directly due to the epidural technique included: acute postoperative retention of urine (3 patients); headaches and dizziness after the additional dosage of bupivacaine (2); profound hypotension (1 patient, 1 occurrence only); and severe pain at the site of catheter insertion necessitating catheter removal (1). Two patients complained that analgesia duration was short (as little as 2 hr). Epidural analgesia appears to be more effective than i.m. pethidine administration in reducing both postoperative pain and incidence of pulmonary infection. The small but significant number of complications arising from the procedure and the additional time it requires may preclude wider adoption of the method; it should, however, be considered for high-risk patients.

9582 OCCURRENCE OF CHOLESTEROL CRYSTALS IN HUMAN BILE. *(E.)* van der Linden, W.; Nakayama, F. (Central Hosp., Ostersund, Sweden). *Gut* 15(8):630-635, 1974.

The occurrence of cholesterol crystals in the gallbladder and hepatic bile of 20 consecutive gallstone patients with functioning gallbladders, in T-tube drain bile from 10 consecutive choledochostomy patients with reestablished enterohepatic circulation, and in hepatic bile from gallstone patients with visualized *versus* non-visualized gallbladders (cholecystography) was studied. In the 1st group, the occurrence of cholesterol crystals rose sharply with the number of stones in the gallbladder. Gallbladder bile more often contained cholesterol crystals than hepatic bile for a given individual. Crystals were absent from the hepatic bile of the 10 T-tube patients; during operation crystals had been present in the hepatic bile of 5. Cholesterol crystals in gallstone patients whose gallbladder was visualized by cholecystography appeared more often than in patients with gallbladders not visualized by cholecystography; in the latter patients crystals tended to disappear after prolonged fasting (more than 12 hr). The composition of bile with cholesterol crystals did not differ significantly from that of bile without crystals. More chenodeoxycholic acid was observed in the bile from patients with non-functioning gallbladders than those with functioning gallbladders.

9583 HEMOBILIA PSEUDOANEURYSM IN THE GASTRODUODENAL ARTERY FOLLOWING CHOLEDOCHOTOMIA. A CASE REPORT. *(E.)* Ekeland, A.; Ofstad, E.; Stiris, G. (Aker Hosp., Oslo, Norway). *Acta Chir. Scand.* 140(5):422-427, 1974.

A case of hemobilia pseudoaneurysm in the gastroduodenal artery of a 52-yr-old male who underwent cholecystectomy and removal of 2 stones from the common bile duct is reported. The patient felt dizzy, started to bleed from the T-tube inserted during his previous operation, and went into shock on the 10th day following the operation; he also developed an obstructive jaundice (bilirubin 11.5 mg%). Aortography showed an aneurysm in the gastroduodenal artery. A pulsating aneurysm was located between the T-tube and the duodenum, right over the common bile duct, during a subsequent operation. A catgut thread was found close to the aneurysmal wall. The thread had been used to close the incision in the common bile duct during the first operation. There was also a hole in the aneurysm and a corresponding hole in the common bile duct, suggesting that the arterial pulsation in the aneurysm had caused pressure necrosis with perforation and leakage of blood into the biliary tree. The common bile duct was occluded by blood clots, causing the patient's jaundice. The clots were removed, and a cholangiogram taken through a new T-tube passed into the perforation in the common bile duct was clear. Recovery after the operation was uneventful. Histological examination of the aneurysm showed that it was a false aneurysm; a homogenous area consisting of catgut was found quite near the perforation opening. The cause of the false aneurysm and the hemobilia appeared to be a catgut suture which had been accidentally placed in the wall of the gastroduodenal artery during closure of the common bile duct.

9584 TRANSDUODENAL SPHINCTEROPLASTY. ITS USE IN THE TREATMENT OF LITHIASIS AND BENIGN OBSTRUCTION OF THE COMMON DUCT. *(E.)* Stefanini, P. Carboni, M.; Patrassi, N.; De Bernardinis, G.; Negro P.; Loriga, P. (Univ. Rome Med. Sch., Italy). *Am. Surg.* 128(5):672-677, 1974.

Immediate and long-term results of transduodenal sphincteroplasty in 712 patients with either lithias or benign obstruction of the common bile duct are reported to illustrate the advantages of sphincteroplasty over choledochoduodenostomy in treating such conditions. Common duct lithiasis accounted for 31 cases, while secondary papillitis, primary papillit and chronic pancreatitis accounted for 182, 34, and 12 cases, resp. There were 7 deaths in the 712 sphincteroplasties, although death was related to surgery in only 1 patient who died of acute pancreatitis. Other mortalities were related to biliary cirrhosis or postoperative complications normally seen in a series of this size. The overall morbidi was 2% and consisted principally of hyperamylasemia bleeding, wound infection, and pneumonitis. Long-term follow-up (55 months average) of 542 patients available for study revealed excellent or good results for 70.5% (no hepatic, biliary, or pancreatic symptoms were present). Complaints of mild tempora pain in the hepatic or pancreatic region and digestive troubles were seen in 26.5%. Symptoms unrelieved by sphincteroplasty persisted in 16 patients recurrent or residual stones (9); stenosis of the sphincter of Oddi and cholangitis (5); ascending cholangitis (1); and persistent pancreatic pain and common bile duct restricture (1). Compared with choledochoduodenostomy, sphincteroplasty avoids the hazards of the sump syndrome and of ascending cholangitis by reflux of intestinal contents into the common duct. A high incidence of postoperative pancreatitis was not observed in patients undergoing sphincteroplasty.

9585 BACTERIA AND BILIARY TRACT DISEASE. *(E.)* Goswitz, J. T. (Med. Coll. Wisconsin, Milwaukee). *Am. J. Surg.* 128(5):644-646, 1974.

Bile specimens for culture were taken from the gallbladder of 118 consecutive patients (25 male and 9 female, most falling between 21-70 yr of age) with disease originating in and involving only the bili ract, to identify those patients who are most likely o have infected bile. The first 50 patients also ad cultures of bile taken from the common bile duct. he incidence of infected bile was only 5.3% for outine cases of chronic cholecystitis with choleithiasis and without complicating ductal stones or cute inflammation. However, the incidence of inected bile increased to 65% for patients with such omplications as acute inflammation or migration of stone from the gallbladder. An acute process, aking the form either of an inflammatory reaction r an obstruction in the ductal system by a galltone, appears essential for the development of inected bile. Coliform organisms predominated among he organisms cultured. Cephalothin was the i.v. ntibiotic of choice. Chloramphenicol can be started .o. if the patient is able to tolerate feedings beore the results of sensitivity studies are returned.

586 BILIARY ATRESIA AND OTHER STRUCTURAL ANOMALIES IN THE CONGENITAL POLYSPLENIA SYNROME. *(E.)* Chandra, R. S. (Children's Hosp. Natl. ed. Ctr., Washington, D.C.). *J. Pediatr.* 85(5): 49-655, 1974.

linical and pathologic findings from autopsy or urgical exploration are presented for 10 children (6 females and 4 males, age 3 days to 6 yr) with ongenital polysplenia syndrome; a subgroup of 5 hildren with biliary atresia and other noncardiac nomalies is examined in detail. Although anomalies f the cardiovascular system usually dominate the linical picture of congenital polysplenia syndrome, 4 of the 5 patients with extrahepatic biliary atresia nd biliary cirrhosis had no associated cardiac anomalies. Liver symmetry was present in 3, and malrotation of the gastrointestinal tract was common to all patients with biliary atresia. Abdominal situs inversus was present in 4 of 10 patients examined, 3 of whom had biliary atresia. Other anomalies specific to the group with biliary atresia were: a bilobed right lung (2 cases); a persistent left superior vena cava to the coronary sinus (1); a preduodenal portal vein (1); and the combination of tracheoesophageal fistula associated with esophageal atresia, malformed thoracic vertabrae, right renal agenesis, and pulmonary levo-isomerism (1). The findings indicate that biliary, respiratory, and intestinal abnormalities are also components of the polysplenia syndrome.

9587 LYSOLECITHIN AND LECITHIN IN THE GALLBLADDER WALL AND BILE: THEIR POSSIBLE ROLES IN THE PATHOGENESIS OF ACUTE CHOLECYSTITIS. *(E.)* Sjodahl, R.; Wetterfors, J. (Univ. Hosp., Linkoping, Sweden). *Scand. J. Gastroenterol.* 9(6):519-525, 1974.

Lecithin and lysolecithin contents of gallbladder bile and wall were analyzed in 28 patients (17 females and 11 males, average age 50 yr) who underwent cholecystectomy for acute or chronic cholecystitis. The patients were divided into 3 groups: chronic cholecystitis with normally colored bile (11 patients); chronic cholecystitis with discolored bile (7); and acute cholecystitis (10). The absolute concentration of lecithin in gallbladder bile from groups 2 and 3 was considerably lower than that for group 1, while the lysolecithin bile concentration was about the same in each group. Lecithin as a percentage of total bile phospholipids in group 2 and 3 patients was 71.5 ± 17.3 and 56.4 ± 8.6 as compared to 97.9 ± 0.6 for patients in group 1. Lysolecithin percentages for chronic, chronic discolored, and acute cases were 0.3 ± 0.1, 4.5 ± 1.9, and 5.5 ± 4.1, resp. Total amount of phospholipids in the latter 2 groups was considerably lower than for normals or group 1 cases. Lysolecithin in plasma was lower than normal in absolute and relative amounts in about 2/3 of the patients with acute cholecystitis, with the mean value (% total phospholipids) being 2.9 ± 1.7 and the absolute concentration being 0.09 ± 0.06 μM/ml as compared to a normal value of 0.20 ± 0.01 μM/ml. Bilirubin concentration in the gallbladder bile of patients in groups 2 and 3 were also much lower (1 or 2 orders of magnitude) than for chronic patients. The increased lysolecithin/lecithin ratio in group 2 and 3 patients indicates that lysolecithin may be locally formed from lecithin. Lysolecithin is not accumulated in the gallbladder wall. The lowered bilirubin concentrations observed 4 days after the beginning of acute cholecystitis supports the importance of the occluded gallbladder in the pathogenesis of acute cholecystitis and is an expression of an increased resorption of bilirubin through the mucous membrane of the gallbladder.

9588 PARTIAL RESECTION OF THE LIVER FOR PRIMARY CHOLANGIOCARCINOMA. PRESENTATION OF A SUCCESSFUL CASE. *(E.)* Sanguily, J.; Calderin, V. O. (Pan American Hosp., Miami, Fla.). *Am. J. Surg.* 128(5):603-607, 1974.

A case of primary cholangiocarcinoma of the liver, treated surgically by wedge resection of the right lobe of the liver, is described. The patient, a 61-yr-old woman, presented with a movable, nontender mass in the upper right quadrant which had been present for 8 months but had produced no symptoms. Physical examination gave essentially negative results. A liver scan revealed a rounded space-occupying lesion with decreased activity present in the anteroinferior aspect of the right lobe. Exploratory laparotomy showed a large whitish tumor with a granular surface, not resembling liver tissue, in the right lobe and just above the gallbladder. The tumor had not adhered to any other abdominal organ, and no signs of an acute inflammatory process were observed. The gallbladder was firmly attached to the tumor which was deeply imbedded therein. The gallbladder was freed from below by doubly ligating the cystic duct and cystic artery with 2-0 black silk. The full thickness of the liver was transected with an electric knife, removing a considerable segment of the right lobe along with a large area of tissue beyond the gallbladder within the normal liver parenchyma. The remaining raw area of the liver tissue appeared normal. Its entire surface was covered with the omentum and sutured with interrupted stitches of 2-0 black silk. This epiploplasty was considered superior to the use of hemostatic material which could have created an inflammatory foreign body reaction. A frozen section study of the tumor indicated cancer of ductal origin. The patient remains in excellent health 2.5 yr after surgery.

9589 RECURRENT PYOGENIC CHOLANGITIS IN CHINESE IMMIGRANTS.

(E.) Ho, C. S.; Wesson, D. E. (Toronto Gen. Hosp., Canada). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 122(2):368-374, 1974.

Findings from pre-operative and operative cholangiographic studies, surgical exploration, laboratory tests, and liver biopsies are presented for 5 Chinese immigrant patients (3 women and 2 men, ages 41-84 yr) with recurrent pyogenic cholangitis (also known as cholangiohepatitis, oriental cholangiohepatitis, and Hong Kong disease). The disease usually occurs in young adults (30-40 yr), with both sexes being equally affected. Clinically, the disease is characterized by recurrent attacks of right upper quadrant pain, fever, chills, and jaundice. Laboratory findings reflect the clinical features of sepsis and obstructive jaundice. Leukocytosis is usually present. Serum bilirubin and alkaline phosphatase are both elevated. Cultures of bile obtained at operation showed *Escherichia coli* infection in most patients. Roentgenologic findings were usually unrevealing, though in 2 cases reported the condition was diagnosed with pre-operative cholangiographic findings. Typical T-tube cholangiographic findings are: a decrease in arborization of intrahepatic radicals; an abnormal branching pattern (normal branching angles are distorted); asymmetric changes in the bile ducts (dilatation throughout or proximal dilatation with rapid tapering towards the periphery); the presence of radiolucent stones anywhere in the biliary tree; and a dilated common bile duct (3-4 cm in diameter). The following conditions produce changes similar in some respects to recurrent pyogenic cholangitis and should be considered in differential diagnosis: extrahepatic obstruction; sclerosing cholangitis; and Caroli's disease.

9590 RELIEF OF OBSTRUCTIVE JAUNDICE THROUGH PERCUTANEOUS TRANSHEPATIC CATHETER - A NEW THERAPEUTIC METHOD.

(E.) Molnar, W.; Stockum, A. E. (Univ. Hosp., Ohio State Univ., Columbus). *Am. J. Roentgenol. Radium Ther. Nucl. Med.* 122(2):356-367, 1974.

The nonsurgical decompression of biliary obstructions with a percutaneous transhepatic catheter for relief of obstructive jaundice is illustrated in summaries of 11 patients (6 females and 5 males, ages 23-80 yr) suffering from either benign postoperative strictures or malignant obstructive lesions. In 2 patients with benign stricture, the transhepatic drainage tube was inserted to improve the patients' conditions prior to contemplated surgical repair, while the condition of the biliary system in the remaining 9 patients precluded further surgical intervention. Indications for treating benign strictures by transhepatic biliary decompression are: postoperative biliary duct stricture with complications; restenosed hepatoduodenal or jejunal anastomosis; and obstruction and intrahepatic stones. Indications for using the method in cases of malignant tumors are: intrahepatic obstruction involving either primary biliary tumors or single hepatic metastasis and extrahepatic obstruction involving recurrent primary biliary tumor recurrent pancreatic tumor; or single porta hepatis metastasis. Hepatorenal failure rules out intrahepatic positioning of a tube for either external or internal drainage in patients with malignant obstruction. Renal dialysis should be initiated before placement of the transhepatic tube in patients with hepatorenal failure and biliary obstruction due to benign stricture. Antibiotic coverage before and after the procedure is mandatory in patients with pending or existing renal failure. Significant delays in clotting mechanisms should be corrected before transhepatic insertion of the drainage tube. The value of transhepatic biliary decompression is questionable in patients with sclerosing cholangitis because of the numerous obstructions within the biliary system.

9591 THE TERMINATION OF THE COMMON BILE DUCT.

(E.) Keddie, N. C.; Taylor, A. W.; Sykes, P. A. (Roy. Infirm., Manchester, England). *Br. J. Surg.* 61(8):623-625, 1974.

Operative cholangiography revealed abnormal terminations of the common bile duct in 23% of 120 patients with biliary tract disease. In 13 of the 27 anomalous terminations observed, the termination was at the junction of the 2nd and 3rd parts of the duodenum while termination in another 13 patients was in the 3rd part of the duodenum at a point 2 cm distal to the junction of the 2nd and 3rd parts. The common bile duct of 1 patient joined the distal end of the 3rd part of the duodenum. Post-operative T-tube cholangiography of 10 patients with anomalous terminations was conducted to investigate whether the position of the ampulla of Vater varies during duodenal peristalsis. No ampullary movement was seen in 3 patients, and no conclusions were reached in the remaining 7 since the radiocontrast material failed to outline the distal part of the common bile duct during peristalsis. Terminations at the junction of the 2nd and 3rd parts as well as terminations in the proximal 2 cm of the 3rd part of the duodenum should be surgically accessible through a standard duodenotomy. Difficulty is only anticipated in the rare instances of termination in the distal portion of the 3rd part of the duodenum.

9592 JUVENILE CHOLELITHIASIS.

(Sp.) Rodriguez Cuartero, A.; Morata Garcia, F.; Pelaez Redondo, J. (San Cecilio Clin. Hosp., Granada, Spain *Rev. Esp. Enferm. Apar. Dig.* 43(5):529-538, 1974.

Of 600 cases of cholelithiasis, 3 were diagnosed in girls less than 20 yr old. Two patients were 16 yr old and the other was 19 yr old. All 3 patients had histories of biliary colic which, in 1 case, dated back 10 yr; the other 2 patients had 1-yr histories. Episodes of colic were accompanied by nausea and vomiting of bile in all 3 cases. No changes in bilirubin or lipid metabolism were found in any of these 3 patients. Cholelithiasis was diagnosed by oral cholangiography in all 3 patients. At surgery, more than 100 stones were found in the gallbladder of one patient and 45 stones in the other; the remaining patient refused surgery.

9593 SYNDROME OF INCOMPLETE BILE DUCT OBSTRUCTION IN CHOLECYSTECTOMIZED PATIENTS. *(Cz.)* Keclik, M.; Huslarova, A.; Horacek, F. (Polyclin. Fac., Charles Univ., Prague, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 28(1):31-36, 1974.

Clinical and surgical findings were analyzed for 98 cholecystectomized patients who later developed cholestasis and had to be reoperated. At the first operation, 21 patients had choledochoduodenostomies (group 1) and 77 did not (group 2). Since only about 1/2 of these patients developed jaundice, diagnoses were difficult to make; fully 1/3 had only simple attacks of pain. By using i.v. cholangiography, stones were detected in only 2/3 of those who had them at surgery. Serum alkaline phosphatase values were elevated (higher than 13.5 King-Armstrong U) in 1/2 of the patients. Measurements of the width of the bile duct revealed dilatation (widths greater than 16 mm) in about 1/2 of the patients examined and ruled out obstruction in only 5.5%. Caroli's BSP time was positive (longer than 24 min) in 1/4 of the patients and negative in only 8%; no difference was found between patients with and without stones. At reoperation of patients in group (1), 17 had anastomotic stenosis, 2 had extrahepatic obstruction, and 2 had pancreatic carcinoma. Amoung the patients in group (2), choledocholithiasis was diagnosed in 47 cases (61%) and was associated with papillary stenosis or pancreatitis in 29 cases. Biliary or papillary stenosis was detected in 18 cases, pancreatic disease in 6 cases, biliary dilatation with no evidence of obstruction in 4 cases, and biliary trauma in 5.2%; the cause of cholestasis was not clear in 2 cases. One of these patients had cirrhosis associated, after cholecystectomy, with symptoms of cholestasis and later passed stones in the stools. The second patient had chronic hepatitis with an atypical pain syndrome.

9594 ASSOCIATION BETWEEN CHOLELITHIASIS AND CROHN'S DISEASE. *(Cz.)* Dvorakova, H.; Setka, J.; Balas, V.; Niederle, B. (Fac. Gen. Med., Charles Univ., Prague, Czechoslovakia). *Cesk. Gastroenterol. Vyz.* 28(1):46-51, 1974.

Of 22 patients with terminal ileitis, 7 (6 women and 1 man, aged 32-61 yr) also had cholelithiasis. In contrast, only 1 of 126 patients with ulcerative colitis had cholelithiasis. Of these 7 patients, 5 developed intestinal symptoms first, 1 had symptoms of cholelithiasis first, and 1 developed symptoms of both diseases simultaneously. Intestinal symptoms were clearly evident in all patients and consisted of diarrhea (5 cases), pain in the periumbilical or right mesogastric regions (5), and disturbances in intestinal transit (3). Only 2 patients, however, had typical biliary colic. Three patients were mistakenly suspected of gynecological disease and 1 was thought to have postcholecystectomy syndrome. The diagnosis of terminal ileitis was missed in 3 cases. Two of these 7 patients were monozygotic twins. The best results were obtained by simultaneous surgical treatment for both diseases, i.e. cholecystectomy, resection of the terminal ileum, hemicolectomy, or anastomosis between the ileum and transverse colon. Cholelithiasis was treated conservatively in 2 patients who had undergone surgery for terminal ileitis 12 yr before. One patient died of peritoneal abscesses 10 days after surgery for terminal ileitis. It is suggested that terminal ileitis may cause cholelithiasis due to impairment of the enterohepatic circulation of bile salts which, under normal conditions, help prevent precipitation of cholesterol from the bile. This impairment of bile salt absorption is more pronounced in patients who have undergone resection of the terminal ileum, where active transport of bile acids occurs, than in patients who have not undergone surgery for terminal ileitis.

9595 PRIMARY LYMPHOMA OF THE GALLBLADDER. CASE REPORT AND REVIEW OF THE LITERATURE. *(E.)* Botha, J. B. C.; Kahn, L. B. (Dept. Pathol., Univ. Cape Town, South Africa). *S. Afr. Med. J.* 48(31): 1345-1349, 1974.

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9599 CHOLECYSTITIS WITHOUT LITHIASIS. *(Dut.)* De Groote, J. (St. Rafael Gen. Hosp., Louvain, Belgium). *Tijdschr. Geneeskd.* 29(14):668-669, 1973.

9600 A SELECTIVE DEFECT IN CYTOCHROME P-450-DEPENDENT BIOTRANSFORMATION IN GALLSTONE CARRIERS. *(E.)* Czygan, P.; Greim, H. (Dept. Med., Univ. Heidelberg, Germany). *Digestion* 10(4-5):318, 1974.

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9602 THE EFFECT OF GLYCEROPHOSPHATE ON LITHOGENIC BILE: A NEW APPROACH TO TREATMENT OF PATIENTS WITH CHOLELITHIASIS. *(E.)* Linscheer, W. G.; Raheja, K. L.; Regensburger, E. C.; Bertrand, G. (VA Hosp., Syracuse, N.Y.). *Gastroenterology* 67(4):811, 1974.

9603 UNCONJUGATED BILIRUBIN (UCB) AND HYDROLYSIS OF CONJUGATED BILIRUBIN (CB) IN GALLBLADDER BILE OF PATIENTS WITH PIGMENT OR CHOLESTEROL GALLSTONES. *(E.)* Boonyapisit, S. T.; Trotman, B. W.; Ostrow, J. D. (VA Hosp., Philadelphia, Pa.). *Gastroenterology* 67(4):781, 1974.

9604 A CASE OF CHOLELITHIASIS IN A 6-YEAR-OLD GIRL. *(Pol.)* Demkow, T. (Miners' Hosp., Ostrow, Poland). *Wiad. Lek.* 26(15):1439-1441, 1973.

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9614 CHENODEOXYCHOLIC ACID AND PHENOBARBITAL EFFECT THE RATE-LIMITING ENZYMES OF CHOLESTEROL AND BILE ACID SYNTHESIS IN MAN. *(E.)* Bonorri G. G.; Coyne, M. J.; Goldstein, L. I.; Schoenfield, L. J. (Cedars-Sinai Med. Ctr., Los Angeles, Calif.). *Gastroenterology* 67(4):780, 1974.

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9618 EFFECT OF AMYLOBARBITONE ON BILE ACID KINETICS IN MAN. *(E.)* Horak, W.; Waldra R.; Davis, M.; Manthorpe, D. J.; Williams, R. (King Coll. Hosp., London, England). *Digestion* 10(4-5): 324, 1974.

See also, 9360, 9408, 9424.

9619 THE SMALL INTESTINAL LESION INDUCED BY HAWAII AGENT ACUTE INFECTIOUS NONBACTERIAL GASTROENTERITIS. *(E.)* Schreiber, D. S.; Blacklow, N. R.; Trier, J. S. (Boston Univ. Med. Ctr., Mass.). *J. Infect. Dis.* 129(6):705-708, 1974.

The morphology of the proximal small intestinal mucosa of 6 healthy adult male volunteers receiving an inoculum of Hawaii agent, which produces nonbacterial gastroenteritis, was studied by light microscopy. Two volunteers developed clinical gastroenteritis and an intestinal mucosal lesion with altered mucosal architecture, mucosal inflammation, and abnormal-appearing absorptive cells. This lesion was indistinguishable from the intestinal lesion demonstrated previously in volunteers who had ingested Norwalk agent, another agent known to produce nonbacterial gastroenteritis. In addition 2 of 4 asymptomatic volunteers developed the typical mucosal lesion. The 3rd asymptomatic volunteer developed late, mild, nonspecific histologic changes. Biopsies from the 4th asymptomatic volunteer remained normal. These findings indicate that Hawaii agent, although apparently immunologically distinct from Norwalk agent, produces an identical lesion of the proximal small intestine. This suggests that this lesion is characteristic of viral gastroenteritis and not restricted to disease produced by one specific infectious inoculum.

9620 UPPER GASTROINTESTINAL BLEEDING CAUSED BY VASCULAR FISTULAS. *(Sp.)* Perez Carnero, A.; Mino Fugarolas, G.; Hita Perez, J.; Muro, J.; Diago Ferrero, A. (La Paz Munic. Sanit., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 44(1):1-8, 1974.

Case reports are presented for 5 patients who had gastrointestinal bleeding due to vascular fistulas. Of 2 esophagoaortic fistulas, one was caused by an esophageal ulcer, 4 cm in diameter, communicating with the aorta; this ulcer is attributed to irritation caused by a fishbone. The second resulted from an esophageal carcinoma ulcerating into the mediastinum and infiltrating the wall of the aorta. Both patients died after massive gastrointestinal hemorrhages. Three months after tonsillectomy, a 9-yr-old girl died of a ruptured aneurysm of the left internal carotid artery which opened into the pharyngeal cavity. A 58-yr-old man with a 2-yr history of repeated hematemesis and melena died of massive bleeding after surgery for a ruptured aneurysm of the gastroduodenal artery. Autopsy showed a retropancreatic, juxtarenal hematoma associated with the aneurysm which communicated with the pancreatic duct. A 31-yr-old man developed epigastric pain radiating to the right hypochondrium, progressive jaundice, hematemesis, and melena 14 days after a traffic accident in which his fibula and acetabulum were fractured. Surgery showed ruptured hepatic blood vessels which communicated with the biliary tract.

9621 DIAGNOSIS OF SALIVARY GLAND TUMORS. *(E.)* Friedman, E. W.; Schwartz, A. E. (Mt. Sinai Sch. Med., New York, N.Y.). *Cancer J. Clin.* 24(5): 266-273, 1974.

9622 TUMORS OF THE SUBMANDIBULAR GLAND. *(E.)* Trail, M. L.; Lubritz, J. (Louisiana State Univ. Med. Ctr., New Orleans). *Laryngoscope* 84(7): 1225-1232, 1974.

9623 A QUANTITATIVE ULTRASTRUCTURAL STUDY OF THE PLEOMORPHIC ADENOMA (MIXED TUMOR) OF HUMAN MINOR SALIVARY GLANDS. *(E.)* Chisholm, D. M.; Waterhouse, J. P.; Kraucunas, E.; Sciubba, J. J. (Univ. Illinois Med. Ctr., Chicago). *Cancer* 34(5):1631-1641, 1974.

9624 ALKALINE PHOSPHATASE ACTIVITY ASSOCIATED WITH THE NUCLEAR PORE IN NORMAL AND NEOPLASTIC SALIVARY GLAND TISSUE. *(E.)* Cutler, L. S.; Chaudhry, A. P.; Montes, M. (Univ. Connecticut Health Ctr., Farmington). *J. Histochem. Cytochem.* 22(12): 1113-1117, 1974.

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9627 ACRODERMATITIS ENTEROPATHICA. REPORT OF A CASE HEALED WITH ZINC THERAPY. *(E.)* Thyresson, N. (Karolinska Hosp., Stockholm, Sweden). *Acta Derm. Venereol. (Stockh.)* 54(5):383-385, 1974.

9628 THE VATER ASSOCIATION. ONE END OF A SPECTRUM OF ANOMALIES. *(E.)* Barry, J. E.; Auldist, A. W. (Dept. Pediatr., Univ. Melbourne, Australia). *Am. J. Dis. Child.* 128(6):769-771, 1974.

9629 ACUTE NECROTIZING ENTEROCOLITIS: RECOGNITION AND MANAGEMENT. *(E.)* Santulli, T. V. (Columbia-Presbyterian Med. Ctr., New York, N.Y.). *Hosp. Pract.* 9(11):129-135, 1974.

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9635 RADIOLOGICAL DIAGNOSIS OF FISTULAS IN THE GASTROINTESTINAL REGION. *(Ger.)* Anacker, H. (Inst. Radiol. Diagn., Tech. Coll., Munich, Germany). *Langenbecks Arch. Chir.* 337:135-140, 1974.

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9638 A MULTI-CENTRE CLINICAL TRIAL OF ANDURSIL TABLETS. *(E.)* Miller, P. I. (no affil.). *J. Int. Med. Res.* 2(2):59-64, 1974.

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9641 HALOPERIDOL PARENTERALLY FOR TREATMENT OF VOMITING AND NAUSEA FROM GASTROINTESTINAL DISORDERS IN A GROUP OF GERIATRIC PATIENTS: DOUBLE-BLIND, PLACEBO-CONTROLLED STUDY. *(E.)* Robbins, E. L.; Nagel J. D. (Stella Maris Hospice, Lutherville-Timonium, Md.). *J. Am. Geriatr. Soc.* 13(1):38-41, 1974.

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9663 Vibrio parahaemolyticus IN THE REPUBLIC OF KOREA. *(E.)* Chun, D.; Chung, J. K.; Seol, S. Y.; Tak, R. (Sch. Med., Kyungpook Natl. Univ., Taegu, Korea). *Am. J. Trop. Med. Hyg.* 23(6):1125-1130, 1974.

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9665 RIFAMPICIN THERAPY IN Escherichia coli GASTROENTERITIS. *(E.)* Naveh, Y.; Friedman, A. (Rambam Univ. Hosp., Haifa, Israel). *Postgrad. Med. J.* 50(589):707-709, 1974.

See also, 9218, 9221, 9254, 9374.

GENERAL

Parasitology

666 HOOKWORM ENTEROPATHY. *(E.)* Falaiye, J. M.; Oladapo, J. M.; Wali, S. S. (Coll. Ied., Univ. Lagos, Nigeria). *J. Trop. Med. Hyg.* 77(9):211-214, 1974.

Histologic and functional appraisal of 12 patients with hookworm disease showed subtotal villous atrophy in 3 and subnormal xylose absorption in 8. There was no relation between the load of hookworm infestation and the xylose malabsorption or the severity of jejunal mucosal damage. Seven of the 8 patients with xylose malabsorption were moderately to severely anemic, but the anemia showed no correlation with jejunal histologic abnormalities. Hypoalbuminemia in 10 patients was associated with subnormal xylose absorption in 8, and all 3 patients with subtotal villous atrophy were severely hypoalbuminemic. Protein deficiency is apparently the basis for intestinal abnormalities in hookworm disease.

9667 ARRESTED DEVELOPMENT IN *Ancylostoma duodenale*: COURSE OF A SELF-INDUCED INFECTION IN MAN.

(E.) Nawalinksi, T. A.; Schade, G. A. (Sch. Hyg. Pub. Hlth., Johns Hopkins Univ., Baltimore, Md.). *Am. J. Trop. Med. Hyg.* 23(5):895-898, 1974.

The course of s self-induced infection with about 100 *Ancylostoma duodenale* larvae was followed by twice-weekly blood and stool examinations. After a small initial increase (511 to 779/mm^3), no further change in eosinophil counts occurred until week 33 when they began to increase sharply. Eggs appeared in stools 7 weeks later, after 5-6 times the normal prepatent period; the total eosinophil count at this time was 5262/mm^3. The mean egg count for the 1st week of patency was 262 eggs/g feces. This rose to 870 eggs/g feces for the 14th and 15th weeks of patency (weeks 54 and 55 postinfection). At weeks 75 and 76 postinfection, the egg count was 2575 eggs/g feces. Blood cell counts at week 78 showed 2851 eosinophils/mm.^{3} Apparently a strain of *A. duodenale* exists which either has an inherent, abnormally long prepatent period or a prepatent period susceptible to change, depending on the environmental conditions experienced by the free-living larvae. In either case, the 3rd-stage larvae probably enter a hypobiotic state within the host which lasts for about 8 months.

9668 SCHISTOSOMAL DISEASE OF THE COLON: A REVERSIBLE FORM OF POLYPOSIS.

(E.) Nebel, O. T.; El Masry, N. A.; Castell, D. O.; Farid, Z.; Fornes, M. F.; Sparks, H. A. (Naval Reg. Med. Ctr., San Diego, Calif.). *Gastroenterology* 64(5):939-943, 1974.

The effect of niridazol therapy (25 mg/kg/day for 10 days) in 15 patients with schiostosmal colonic polyposis was evaluated by direct visual inspection with the fiberoptic colonoscope and by biopsy. Patients were seen 3, 6, and 12 months after treatment. Pretreatment evaluation included physical examination, laboratory studies, stool parasitology, colonoscopy, and colon biopsy. Pretreatment anemia, present in all patients, was corrected by 3 months. Serum albumin, decreased in 11 patients, rose to normal levels by 12 months. Stool and urine were negative for schistosoma eggs (*Schistosoma mansoni* and *Schistosoma haematbium*) by 3 months. At 12 months, 4 patients showed complete resolution of polyposis and the remainder showed marked improvement in polyp size, friability, and number. In addition, all 12-month post-treatment biopsies were negative for viable eggs and permanent sections of colonic mucosal biopsies showed no histologic abnormalities. The results support the efficacy of medical treatment of schistosomal polyposis and indicate that polyposis may be a reversible lesion.

9669 THE EFFECT OF TINIDAZOL IN AMOEBIC PROCTOSIGMOIDITIS: A STUDY OF THIRTY-SIX CASES.

(E.) de Esesarte, G. (Natl. Inst. Nutr., Mexico City, Mexico). *J. Int. Med. Res.* 2(5):355-358, 1974.

Clinical, endoscopic, and parasitological findings are reported for 36 patients (16 males and 20 females, aged 12-48 yr) with amebic proctitis treated with p.o. administration of tinidazole (2000 mg/day for 2 days). The clinical response relative to colic pain, bloody-mucus stools, tenesmus, and pain on abdominal palpation 5-10 days after commencement of treatment was excellent (asymptomatic) in 21 patients. Very good improvement was observed in 12 patients, slight improvement in 2, and no improvement in 1 case. Endoscopic findings in the same period showed a normal mucosa in 24 cases, congestive image without ulcers in 9 patients, a few ulcers in 2 cases, and abundant ulcers in 1 case. The trophozoite was isolated in only 2 cases. An evaluation after 30 days showed clinical, endoscopic, and parasitological cure in 31 patients. Three cases were therapeutic failures and 2 persons dropped out of the study. Side effects were observed in 2 cases and consisted of slight transitory nausea.

9670 KALA-AZAR IN THE MALTESE ISLANDS.

(E.) Busuttil, A. (Western Infirm., Glasgow, Scotland). *Trans. R. Soc. Trop. Med. Hyg.* 68(3): 236-240, 1974.

9671 TREATMENT OF AMEBIASIS.

(E.) Uthman, S. M. (Dept. Intern. Med., American Univ. Beirut, Lebanon). *J. Med. Liban.* 27(3):351-352, 197

9672 AMEBIASIS IN A MENTAL INSTITUTION: SEROLOGIC AND EPIDEMIOLOGIC STUDIES.

(E.) Sexton, D. J.; Krogstad, D. J.; Spencer, Jr., H. C.; Healy, G. R.; Sinclair, S.; Sledge, C. E.; Schultz, M. G. (Mississippi State Hosp., Whitfield). *Am. J. Epidemiol.* 100(5):414-423, 1974.

9673 NON-DYSENTERIC AMOEBIC COLITIS TREATED WITH TWO GRAMMES OF METRONIDAZOLE GIVEN AS A SINGLE DOSE FOR TWO DAYS.

(E.) Mathur, T. N.; Kaur, J. (Haryana Gov. Public Health Lab., Karnal, India). *Indian J. Med. Res.* 62(8):1208-1211, 1974.

9674 PREVALENCE OF *Entamoeba hystolytica* AND OTHER PROTOZOAL AND HELMINTHIC INFECTIONS IN HOSPITAL PATIENTS IN KARNAL (HARYANA).

(E.) Mathur, T. N.; Kaur, J. (Haryana Gov. Public Health Lab., Karnal, India). *Indian J. Med. Res.* 62(8): 1212-1216, 1974.

9675 INTESTINAL TRAUMA RESULTING FROM FEEDING ACTIVITIES OF Ancylostoma caninum. *(E.)* Kalkofen, U. P. (Sch. Public Health Trop. Med., Tulane Univ., New Orleans, La.). *Am. J. Trop. Med. Hyg.* 23(6):1046-1053, 1974.

9676 FUNCTIONAL AND HISTOLOGICAL CHANGES OF SMALL BOWEL IN PATIENTS WITH Giardia lamblia INFESTATION. *(E.)* Tewari, S. G.; Tandon, B. N. (All-India Inst. Med. Sch., New Delhi). *Indian J. Med. Res.* 62(5):689-695, 1974.

9677 THE HOOKWORM PROBLEM IN THE RHODESIAN LOW-VELD: ITS IMPORTANCE AND TREATMENT. *(E.)* Goldsmid, J. M.; Morrison, J. F.; Saunders, C. R. (no affil.). *Cent. Afr. J. Med.* 20(5):97-100, 1974.

9678 INFLUENCE OF A METAZOAN INFECTION IN THE MOUSE ON ENTERIC COLONIZATION AND IMMUNE RESPONSE TO Escherichia coli. *(E.)* Cypess, R. H.; Swidwa, D. W.; Kenny, J. F.; Yee, R. B. (Dept. Epidemiol., Univ. Pittsburgh, Pa.). *J. Infect. Dis.* 130(5):534-538, 1974.

9679 THE CHICK EMBRYO AS AN EXPERIMENTAL HOST FOR DEVELOPING LARVAE OF Taenia hydatigena. *(E.)* Parmeter, S. N.; Gemmell, M. A. (Wallaceville Animal Res. Ctr., Private Bag, New Zealand). *J. Parasitol.* 60(6):1048-1049, 1974.

9680 TREATMENT OF THE CYSTIC STAGE OF Taenia crassiceps AND Echinococcus multilocularis IN LABORATORY ANIMALS. *(E.)* Campbell, W. C.; Blair, L. S. (Merck Inst. Ther. Res., Rahway, N.J.). *J. Parasitol.* 60(6):1053-1054, 1974.

9681 THE DISTRIBUTION OF Nippostrongylus brasiliensis IN PROLONGED INFECTIONS IN LACTATING AND NEONATALLY INFECTED RATS. *(E.)* Connan, R. M. (Dept. Animal Pathol., Cambridge, England). *Parasitology* 68(3):347-354, 1974.

9682 Nippostrongylus brasiliensis: THE DISTRIBUTION OF PRIMARY WORM POPULATIONS WITHIN THE SMALL INTESTINE OF NEONATAL RATS. *(E.)* Jenkins, D. C. (Res. Lab., May & Baker Ltd., London, England). *Parasitology* 68(3):339-345, 1974.

9683 THE VALUE OF ANGIOGRAPHY IN Echinococcus alveolaris OF THE LIVER. *(E.)* Wolfert, W.; Rudofsky, G.; Rau, R. M. (Dept. Intern. Med., Univ. Ulm, Germany). *Digestion* 10(4-5):388-389, 1974.

9684 HUMAN INFECTION WITH THE LIVER FLUKE Fasciola gigantica. *(E.)* Hammond, J. A. (Ctr. Trop. Vet. Med., Univ. Edinburgh, Scotland). *Trans. R. Soc. Trop. Med. Hyg.* 68(3):253-254, 1974.

9685 HOST-PARASITE RELATIONSHIP OF Fasciola hepatica IN THE WHITE MOUSE. VI. STUDIES ON THE EFFECTS OF IMMUNE AND NORMAL SERA ON THE VIABILITY OF YOUNG WORMS TRANSFERRED TO NORMAL RECIPIENTS. *(E.)* Lang, B. Z. (Dept. Biol., Eastern Washington State Coll., Cheney). *J. Parasitol.* 60(6):925-929, 1974.

9686 STUDIES ON THE SERUM TRANSFER OF IMMUNITY TO Fasciola hepatica IN THE RAT. *(E.)* Hayes, T. J.; Bailer, J.; Mitrovic, M. (Animal Health Res. Dept., Hoffman-La Roche Inc., Nutley, N.J.). *J. Parasitol.* 60(6):930-934, 1974.

See also, 9215, 9216, 9222, 9408, 9519, 9655.

GENERAL

Regional Enteritis

9687 ISOLATED LEFT HYDRONEPHROSIS COMPLICATING ILEOCAECAL GRANULOMATOUS DISEASE. *(E.)* Kutcher, R.; Rosenbaum, A.; Messinger, N. H. (Albert Einstein Coll. Md., Bronx, N.Y.). *Br. J. Radiol.* 47(560):490-492, 1974.

A 21-yr-old man with a 4-yr history of granulomatous ileocolitis presented with fever and back and left leg pain. Barium enema studies confirmed that the disease was confined solely to the distal ileum and proximal ascending colon. Routine excretory urography revealed hydronephrosis of the left kidney accompanied by hydroureter to the level of the superior margin of the left sacral wing. A left psoas abscess was drained through a left-inguinal incision. Surgical exploration showed that the lack of right ureteric involvement was related to the extension of the fistulous tract through the leaves of the mesentery to its root, and from there selectively to the left retroperitoneal region where the abscess developed.

9688 A MORPHOLOGICAL ASSESSMENT OF IMMUNOREACTIVITY IN COLONIC CROHN'S DISEASE AND ULCERATIVE COLITIS BY A STUDY OF THE LYMPH NODES. *(E.)* Skinner, J. M; Whitehead, R. (Radcliffe Infirm., Oxford, England). *J. Clin. Pathol.* 27(3):202-206, 1974.

Mesenteric lymph nodes in total colectomy specimens from 68 patients with ulcerative colitis or Crohn's disease were assessed for immunological reactivity. Lymph node features on routine hematoxylin-eosin sections were classified as normal, reactive paracortical tissue, reactive lymphoid follicles, large lymphoid and plasma cells, sinus dilation, or granulomas. Statistical analysis showed no difference in the distribution of these features and hence function between the two groups. In both ulcerative colitis and Crohn's disease, a combination of morphological features indicates competence of both cellular and humoral mechanisms. Cell-mediated immunity was not diminished in Crohn's disease and the presence of granulomata did not constitute any special immunological group. Differences in immunological reactivity appeared to be more closely related to the presence of ulcers than to the disease involved, with less reactivity noted in the absence of ulceration. Immunohistochemical analysis showed that ulcerative colitis and Crohn's disease did not differ with regard to the level of IgA-, IgG-, and IgM-producing plasma cells in nodes.

9689 THE CLINICAL EFFECT OF SALAZOSULPHAPYRIDINE (SALAZOPYRIN^{R}) IN CROHN'S DISEASE. A CONTROLLED DOUBLE-BLIND STUDY. *(E.)* Anthonisen, P.; Barany, F.; Folkenborg, O.; Holtz, A.; Jarnum, S.; Kristensen, M.; Riis, P.; Walan, A.; Worning, H. (Gentofte Univ. Hosp., Hellerup, Denmark). *Scand. J. Gastroenterol.* 9(6):549-554, 1974.

9690 ASYMPTOMATIC REGIONAL ILEITIS MANIFEST AS FEVER, HEPATIC DISEASE, AND SPLENOMEGALY: REPORT OF A CASE. *(E.)* Putman, C.; Hall, D. A. (Yale Univ. Sch. Med., New Haven, Conn.). *Dis. Colon Rectum* 17(5):705-709, 1974.

9691 INTESTINAL VASCULITIS IN ESSENTIAL, MIXED CRYOGLOBULINEMIA. *(E.)* Reza, M. J.; Roth, B. E.; Pops, M. A.; Goldberg, L. S. (Univ. California Sch. Med., Los Angeles). *Ann. Intern. Med.* 81(5): 632-634, 1974.

See also, 9362, 9594.

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